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PREFACE

The Department of Defense policy requires that military Program Managers (PMs) develop a tailored acquisition strategy that will provide the conceptual basis of the overall plan that a PM follows in program execution. A strategy that is carefully developed and consistently executed is one of the keys to a successful program. It is a difficult and challenging task to blend the multitude of requirements for a system acquisition into an acquisition strategy that also represents a consensus among the organizations that influence or are influenced by the program.

The purpose of this Guide is to provide, in a single source, information that PMs should find useful in structuring, developing, and executing an acquisition strategy. A process for developing and executing an acquisition strategy is provided together with criteria for evaluating a proposed strategy. However, this Guide alone does not provide the PM with a definitive acquisition strategy for ones particular program. Well informed, educated, and innovative applications and judgments concerning the particular mission need are necessary to structure a successful acquisition strategy. PMs should continue to seek guidance, data, and assistance from available sources as they prepare and revise their acquisition strategy.

Thanks are due to Mr. Norman Bull and Mr. Carleton Cooper of Information Spectrum, Incorporated, for extensive support in preparing the fourth edition to this Guide under contract GS-35F-4033G. Thanks are also due to those members of the Defense Systems Management College faculty who reviewed that update during its development and provided constructive suggestions for improvement.

The Defense Systems Management College is the controlling agency for this Guide. Comments and recommendations relating to the text are solicited. You are encouraged to mail such comments to us on the pre-addressed tear sheet located at the back of this Guide.

Norman A. McDaniel
Department Chairman and Professor
Program Management and Leadership

Defense Systems Management College

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1

INTRODUCTION

1.1 DEFINITION

An acquisition strategy[1] is a high-level business and technical management approach designed to achieve program objectives within specified resource constraints. It is the framework for planning, organizing, staffing, controlling, and leading a program. It provides a master schedule for research, development, test, production, fielding and other activities essential for program success, and for formulating functional strategies and plans.

The Program Manager (PM) is responsible for developing and documenting the acquisition strategy, which conveys the program objectives, direction, and means of control, based on the integration of strategic, technical, and resource concerns. A primary goal in developing an acquisition strategy is the minimization of the time and cost of satisfying an identified, validated need—consistent with common sense, sound business practices, and the basic policies established by:

- Department of Defense Directive (DoDD) 5000.1, subject: Defense Acquisition, dated March 15, 1996, with Change 1 incorporated.
- Department of Defense (DoD) Regulation 5000-2-R, subject: Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) Acquisition Programs, dated 15 March, 1996 through Change 4.

The strategy is initially structured during the Concept Exploration (CE) phase of the program to provide an organized and consistent approach to meeting program objectives within known constraints. The acquisition strategy may be a stand-alone document or otherwise included in a key program summary document as specified by the Milestone Decision Authority (MDA), starting at Milestone I. The Air Force refers to this document as the Single Acquisition Management Plan (SAMP), while other Components use differing terminology. Once developed, the acquisition strategy is modified as necessary throughout the acquisition cycle.

A good acquisition strategy is realistically tailored to program objectives and constraints, and is flexible enough to allow innovation and modification as the program evolves. The strategy balances cost and effectiveness through development of technological options, exploration of design concepts, and planning and conduct of acquisition activities. These elements are directed toward either a planned Initial Operational Capability or retention for possible future use, while adhering to a program budget.

---

[1] A closely aligned program document is the Acquisition Plan (AP) required by the Federal Acquisition Regulation/Department of Defense Federal Acquisition Regulation Supplement (FAR/DFARS). It focuses on procurement/contracting processes to implement the acquisition strategy. The performance of acquisition planning as documented in the AP is the responsibility of the PM. The plan is prepared, coordinated, and updated by the contracting officer under procedures established by the head of the contracting activity, with approval of the AP as determined by the Component's Senior Procurement Executive. Reference DFARS 207.105. The similarity of names is a potential source of confusion between the two documents.

The strategy should be structured to achieve program stability by minimizing technical, schedule, and cost risks. Thus the criteria of realism, stability, balance, flexibility, and managed risk should be used to guide the development and execution of an acquisition strategy and to evaluate its effectiveness. The acquisition strategy must reflect the interrelationships and schedule of acquisition phases and events based on a logical sequence of demonstrated accomplishments, not on fiscal or calendar expediency.

1.2 BACKGROUND

Office of Management and Budget (OMB) Circular No. A-11 (superseding OMB Circular A-109) applies to all federal executive agencies. It states that an acquisition strategy should be developed and tailored as soon as the agency decides to solicit alternative system design concepts that could lead to the acquisition of a new major system. Further, it states that steps should be taken to "refine the strategy as the program proceeds through the acquisition process." In general terms, the Circular describes a variety of considerations that such a strategy might include.

The DoD requirements (or guidelines) for an acquisition strategy are contained in Section 3.3 of DoD Regulation 5000.2-R, subject: Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) Acquisition Programs, with Change 4 incorporated. Although most of the requirements stated in DoD 5000.2-R are mandatory only for programs designated as major programs[2], those same requirements provide guidelines for the PM and MDA of less-than-major programs. A thorough review of Section 3.3 of DoD 5000.2-R is recommended prior to initiating or updating an acquisition strategy. This Guide is intended to amplify on those requirements or guidelines, whichever the case may be.

Development, approval, and execution of the acquisition strategy constitute an essential part of the program milestone review process. The initial acquisition strategy is part of the Milestone Review documentation approved by the MDA at Milestone I prior to program initiation. Such approval is critical to the program, for it is a prerequisite to issuance of the Acquisition Decision Memorandum and/or release of the formal solicitation for the next program phase. On an exception basis, the milestone review authority may require a formal review meeting on the acquisition strategy prior to approval.

1.3 ACQUISITION IMPROVEMENT INITIATIVES

Past and present Administrations and Congresses have taken many initiatives to improve the acquisition of defense systems. Several such actions occurred during the 1980s: the Acquisition Improvement Program in DoD, the Federal Acquisition Regulations (FARs) from the Office of Federal Procurement Policy, the Packard Commission Report, and the Defense Management Review directed by the President. Some of the important initiatives related to the above as well as later reviews and developments include the following:

- Deputy Secretary of Defense Frank C. Carlucci's 32 Initiatives (1981) to improve the acquisition process.

- Department of Defense Authorization Act, 1986, P.L. 99-145 (defines the terms "procurement command" as they apply to each service).

[2] See DoD 5000.2-R, Section 1.3, for description of acquisition program categories.

- Military Retirement Reform Act of 1986, P.L. 99-348 (creates the position of Under Secretary of Defense for Acquisition with specific responsibilities stated in later amendments).

- National Defense Authorization Act for Fiscal Year 1987, P.L. 99-661 (states preference for Non-Developmental Items (NDIs) and establishment of baseline descriptions).

- National Defense Authorization Act for Fiscal Years 1990 and 1991, P.L. 101-189 (quantification of articles procured as "Low Rate Initial Production").

- National Defense Authorization Act for Fiscal Year 1991, P.L. 101-510, contains Defense Acquisition Workforce Improvement Act (identifies education and training needs of persons serving in acquisition positions in the DoD; and updates functions of Component Acquisition Executives).

- National Defense Authorization Act for Fiscal Year 1993, P.L. 102-484, (addresses national technology and industrial base, reinvestment, and conversion; and national defense manufacturing technology program).

- Federal Acquisition Streamlining Act (FASA) of 1994, P.L. 103-355 (provides numerous procurement reform measures).

- Information Technology Management Reform Act of 1996 (Clinger-Cohen Act) P.L. 104-106 (requires federal agencies to improve the way they select and manage information technology resources).

Flowing directly or indirectly from these and earlier reviews and laws, a number of strategies and control methods either came into being or were strengthened to make the acquisition process more efficient. Examples of the strategies include Evolutionary Acquisition (EA), NDI Acquisition, Preplanned Product Improvement (P3I), and acquisition of commercial items on commercial terms. Examples of the control methods include the Planning, Programming, and Budgeting System; Selected Acquisition Reports; Defense Acquisition Board deliberations; and the Defense Resources Board deliberations.

Acquisition reform is a current initiative underway to improve the acquisition of DoD systems. The FASA legislation is one of the tangible results of acquisition reform thus far. This Act is focused on simplifying the procurement process and removing impediments to efficient and effective program management. Further, it promotes and provides for increased use of commercial practices and commercial products in DoD systems acquisition.

Of particular importance is employment of Integrated Product and Process Development (IPPD) concepts. Integrated Product Teams (IPTs) are key to the IPPD concepts, and their use is directed for program management and oversight functions, including efforts to develop an acquisition strategy. Equally important is the need to apply the methods established for reengineering the acquisition process.

The acquisition strategy must emphasize the use of open systems and standard interfaces, for these features greatly facilitate system updates to incorporate future technological advances. Further, the strategy must provide an overview of environmental considerations in the development, testing, and operational phases of the entire system under acquisition.

1.4 BENEFITS

Below, paragraphs 1.4.1 through 1.4.4 present five primary benefits that accrue from the development and maintenance of a comprehensive acquisition strategy.

1.4.1 Organized and Consistent Approach

The acquisition strategy serves as a master checklist ensuring that all important issues and alternatives are considered. At any point in the acquisition process, the strategy must address the entire remaining portion of the program, with primary emphasis on the next program phase. Documenting the acquisition strategy is a means of performing adequate strategic planning in the beginning and throughout the program, thereby reducing potential diversions from program objectives that could have adverse cost, schedule, and technical consequences.

1.4.2 Decision Aid

An up-to-date acquisition strategy, reflecting current conditions, acts as a decision aid in several ways. The strategy assists in: prioritizing and integrating many diverse functional requirements, evaluating and selecting important issue alternatives, identifying the opportunities and times for critical decisions, and providing a coordinated approach to the economical and effective achievement of program objectives. When the acquisition strategy is reviewed and approved, a credible, realistic approach to the conduct of the program can be established and advocated by the PM up through the Military Department, the Office of the Secretary of Defense (OSD), and on to the White House and the Congress. The acquisition strategy aids in forming a consensus through recognition that the developed approach is optimal for acquiring and deploying the system (or equipment), or alternatively for developing a Technical Data Package for possible later use.

1.4.3 Means of Achieving Agreement

The acquisition strategy serves as the basis for preparing the plans and activities to accomplish the program. It becomes a contract between the PM and the MDA for achieving program objectives and goals. The acquisition strategy should document the tailoring of acquisition alternatives that are expected to be executed. Thus, it is the base from which all functional planning proceeds. Key elements of the acquisition strategy are reiterated in the Acquisition Program Baseline.

1.4.4 Guide and Baseline on Rules/Assumptions

The acquisition strategy documents the ground rules and assumptions that preceded and then led to program initiation. It acts as a guide and also documents program progress through periodic updates, and therefore provides a documented audit trail for succeeding PMs. It also serves as a standard by which superiors in the chain of command can measure program progress in terms of their program responsibilities.

1.5 TRENDS AND EMPHASES IN THE NEW MILLENNIUM

This section builds on the Acquisition Reform initiatives in 1.3 above, and the on-going reform momentum as DoD moves into the 21st century. In November 1997, the Secretary of Defense brought Acquisition Reform, Financial Management Reform, and other DoD initiatives under the Defense Reform Initiative (DRI). This action was intended to set goals designed to modernize defense business practices to match sweeping changes in America's military affairs. In addition, DRI was to be thought of as an umbrella—a process that ties together DoD reform initiatives. The latest progress report on the DRI and other acquisition strategy related matters, is normally available on the DoD web site DefenseLINK, and the various other DoD Acquisition Reform web sites.

Equally applicable to acquisition strategy, the Under Secretary of Defense for Acquisition and Technology in March 1999 announced the

publication of *Into the 21st Century: A Strategy for Affordability*. This document is the DoD's blueprint for adapting to the Department's needs the best world-class business and technical practices in rationalizing infrastructure, restructuring support systems, and reducing cycles times and ownership costs while improving readiness. *Into the 21st Century: A Strategy for Affordability* was produced by the Defense Systems Affordability Council (DSAC). It lists these goals:

- Field high-quality defense products quickly and support them responsively.
  - Reduce the cycle time of DoD processes for acquisition and support, thus producing cost reduction across-the-board while improving readiness and responsiveness.
- Lower the total ownership cost of defense products.
  - Reduce the investment cost of new systems, thereby increasing the purchasing power of modernization funding; and reduce operating and support costs of fielded systems, thereby making more resources available for modernization.
- Reduce the overhead cost of the acquisition and logistics infrastructure.
  - The cost efficiencies achieved can be reallocated for modernization or essential support.

For each goal, the strategy articulates the DSAC's enterprise level objectives and metrics, and the major initiatives that will contribute to achieving those objectives. The strategy also challenges the Department to achieve some targets by 2005 such as cutting logistics response time to five days and lowering logistics support cost by 20 percent.

1.5.1 Actions Within the Acquisition Strategy

These strategy goals and the contents of the DRI need to be part of a 21st century acquisition strategy. Specific acquisition reform actions and excerpts from DoD 5000.2-R (ACAT (Acquisition Category) I and IA programs) that support these goal are:

- The need to shorten the development cycle time.
  - Streamlining: The PM shall streamline all acquisitions so that they contain only those requirements that are essential and cost-effective.
  - Tailoring: Tailored acquisition strategies may vary the way in which core activities are to be conducted, the formality of reviews and documentation, and the need for other supporting activities. ACAT II and III program managers shall work with their decision authorities to tailor any documentation and decision points to the needs of the individual program.
  - Integrated Product and Process Development (IPPD): The PM shall employ the concept of Integrated Product and Process Development (IPPD) throughout the program design process to the maximum extent practicable. The use of IPTs is a key tenet of IPPD.
- The need to control (and where possible reduce) the life-cycle cost of existing systems and new system acquisitions.
  - Competition: PMs and contracting officers shall provide for full and open competition, unless one of the limited statutory exceptions apply. PMs and contracting officers shall use competitive procedures

best suited to the circumstances of the acquisition program. The acquisition strategy for all acquisition programs shall describe plans to attain program goals via competition in all increments and life-cycle phases.

- Cost As an Independent Variable (CAIV): CAIV is a process that helps arrive at cost objectives (including life-cycle costs) and helps the requirements community (based cost-schedule-performance trade-offs during each phase of the acquisition process) set performance objectives. The CAIV process shall be used to develop an acquisition strategy for acquiring and operating affordable DoD systems by setting aggressive, achievable cost objectives and managing achievement of these objectives.

- Integrated Digital Environment (IDE): The PM shall be responsible for establishing a data management system and appropriate IDE that meets the data requirements of the program throughout its total life-cycle.

• Open system architecture (to permit system update in step with technological advances and changing threat).

- Commercial sytems and commercial items: In developing and updating the acquisition strategy, the PM shall consider all prospective sources of supplies and/or services that can meet the need, both domestic and foreign. Commercial and non-developmental items shall be considered as the primary source of supply. Market research and analysis shall be conducted to determine the availability and suitability of existing commercial and non-developmental items prior to and during the development effort, and prior to the preparation of any product description.

- Standard/commercial interface requirements specifications: PMs shall establish open systems objectives, document their approach specifying the level(s) of openness of system, and devise an open systems strategy to achieve these objectives. The strategy focuses on fielding superior warfighting capability more quickly and more affordably by using multiple suppliers and commercially supported practices. Open system-based commercial items are defined as items that use open standards as their primary interface standards.

• Interoperability with NATO and other allies: Compatibility, interoperability, and integration are key goals that must be satisfactorily addressed for all acquisition programs. Where appropriate, include discussion of interoperability and commonality of components/ systems that are similar in function to other DoD Component programs or Allied programs. This is particularly true of Command, Control, Communications, Computers, and Intelligence (C4I) systems and documentation linked to the Analysis of Alternatives, system engineering, and software engineering.

2

ACQUISITION STRATEGY CHARACTERISTICS

2.1 CHARACTERISTICS/CRITERIA

An acquisition strategy must provide the basis for meeting program objectives, thereby acting as an aid in gaining program acceptance and support. Accordingly, five characteristics are required for a credible acquisition strategy: *realism, stability, resource balance, flexibility*, and *managed risk*. This section provides a working definition of each criterion, explains why it is important and what pressures work against it, and outlines the steps necessary to achieve it.

2.1.1 Realism

An acquisition strategy is realistic if the program objectives are attainable and the strategic approach to satisfying them can be successfully implemented with reasonable assurance. Realism cannot be easily quantified, but there are some measurable properties. For example, a two-fold increase in present performance may be more realistic (attainable) than a three-fold increase. Ranking methodologies, as well as probability and statistical analyses, are practical measurement techniques.

Only a realistic approach will elicit support for the program at all levels. A strategy that is unrealistic can result in continuous turmoil and crises, and may lead to ultimate failure. With mounting evidence that certain milestones are not attainable, the first reaction is to try "Band-Aid" approaches, such as shifting funds from another area or deferring the work. Even if such temporary measures work, the activities that were "taxed" may be placed in an under-funded position. Deferred activities can cause interface and scheduling problems, leading to more temporary patches. The best way to avoid such a situation is to set requirements related to technical, cost, and schedule factors well within capabilities. Simply stated, the acquisition strategy should represent a conceptual plan that is neither too optimistic nor too conservative—another way of defining realism.

The Program Manager (PM) must recognize that there are pressures in his role that work against realism. Some of the more common forms of pressure are cited below.

Competing Alternative Approaches. An immediate goal of a PM is to gain program acceptance and to see that it is approved, funded, and started. This requirement often induces unrealistic conditions such as matching or exceeding the claimed capability or milestones of a competing approach, or accepting beyond state-of-the-art performance requirements based on an insupportable analysis of a future threat.

Acceptance of an Inflexible Set of Requirements. This stance does not permit trade-offs, and forces the PM to force-fit an acquisition strategy, introducing unrealistic conditions.

Strategy Directed by Higher Authority. Pressures on the PM from the upper echelons may lead to an acquisition strategy with limited alternatives and insufficient planning, or introduce over-optimism with regard to schedule and resource requirements.

Low Program Priority Within The Service. A low priority program may tempt the PM to recite doctrinally correct program concerns and avoid documentation of relevant interests and concerns.

PM Reaction to Micro-Management. The PM may adopt a "close to the vest" syndrome, so that minimal details of the conceptual approach are presented, which in turn reduces the guidance available to functional managers in their efforts to support the program.

Strong Competition. Competing systems or strong high-level opposition to the program may induce the PM to counter by introducing unrealistic goals or management approaches in the acquisition strategy.

There is no simple formula for achieving realism. It entails detailed study of the threat, assessment of the state-of-the-art in all technology areas, review of past performance on similar acquisitions or systems, a survey of industry capability, followed by the attainment of a consensus once the analysis is complete. Studies take time and resources, but since realism is such an important criterion for a successful strategy, every effort should be made to support this undertaking in critical areas.

2.1.2 Stability

Acquisition stability is the characteristic that inhibits negative external or internal influences from seriously disrupting program progress. Negative influences frequently cause changes in cost, schedule, or performance requirements that can threaten the achievement of milestones. It would be naive to assume that any significant program will not encounter situations that can change the course of the program to some extent. Some of these situations may be well beyond any strategic program control—e.g., a greatly increased threat capability of a potential enemy that seriously negates the operational value of the system under development.

Any change in critical system or acquisition parameters can ripple throughout the program, cause serious disruptions, reduce confidence in program estimates and assumptions, increase government and contractor risk, and reduce morale and motivation. Frequently, when a major change is made, as in funding, a "downstream" parameter such as operational readiness or logistics support bears the brunt of the change, and system operational capability can be significantly affected. However, there are many potential causes of instability that can be countered to some extent by a carefully designed acquisition strategy.

Five key factors work against stability:

- **The Funding Process.** A number of exogenous factors may produce changes to the yearly funding levels. The changes may require program stretch-outs, a reduction in operational capability, or reduced production quantities.

- **Requirements Changes.** The perceived threat level may change or the user may desire more or less capability, any one of which may result in disruption of technical progress.

- **Changing Acquisition Policy or Philosophy.** Changing administrations, executives, or political climates can result in revised policy, which may exert pressures to change the strategy to conform to the new thinking.

- **Industry Risks.** Contractors may be faced with an untenable risk or profit position through buy-in, loss of a major contract, or failure to modernize. The consequences may require additional program money and time, and may possibly result in new contractor sources.

- **Organizational and Personnel Changes.** These changes may result in lack of continuity, lack of accountability, loss of audit trail, and/or changes in directions, processes, and procedures.

Four elements related to acquisition strategy can enhance program stability:

- **Direction.** A strategy must impart a sense of knowing where the program is headed, and when and how each goal will be achieved, achieved by delineating overall program objectives, approaches, and control procedures.

- **Advocacy.** Programs that lack high-level support are initial targets for program changes. The PM must know who the initial supporters are, keep them informed, and if feasible, cultivate new supporters.

- **Commitment.** The PM should strive for agreements that cannot easily be canceled. If the government establishes an agreement with an external party, then a measure of stability is achieved. Two significant examples are a Memorandum of Agreement with a foreign government for joint development or future delivery, and a Multi-Year Procurement contract.

- **The use of IPTs.** When properly oriented and challenged, the multifunctional members of the IPT become committed to program success, thereby reducing parochial or functional imbalances that could otherwise lead to future instability.

2.1.3 Resource Balance

Resource balance is a condition of equilibrium between and within major program objectives that are competing for resources. The achievement of cost, schedule, and performance requirements uses resources of time, people, facilities, and money—all of which are limited. Implementing Cost As an Independent Variable (CAIV), an Acquisition Reform initiative, facilitates the achievement of this resource balance. The degree of balance is difficult to measure directly, but it can be measured in terms of risk in meeting objectives. In this sense, a balanced program is one for which all the risks are approximately equal, where the risk measure includes establishment of priorities and assessment of damages in case of failure.

The PM must respond to high-level direction, which often presents conflicting demands. For example, consider the following set of program objectives: the acquisition cycle time must be reduced, operational testing under realistic conditions must be held to a realistic minimum, and high performance and readiness must be achieved. Overemphasis on one objective could jeopardize the chances of meeting other objectives. By understanding the priorities, relationships, risks, and required resources for each objective, the PM can develop a strategy that provides the necessary balance and the justification to say "No," or "Yes, but ....," with conviction when changes by the user, headquarters, contractors, or others, are requested.

Parochialism is probably the major pressure working against balance. Just as the PM must do everything legitimately possible to ensure program success, functional managers operate from the same premise relative to their functional area. The PM must recognize that the user wants the best-performing system and wants it quickly; financial offices in Headquarters want to lower program cost; and the contractor wants to lower risk. Again, the use of Integrated Product Teams (IPTs) should help to achieve balance. In addition, external situations may have a severe impact on balance. Examples include the emerging importance of environmental impacts, energy concerns induced by fuel shortages, and reduced funding because of the economic climate.

Understanding the mission requirements and priorities of objectives is a key factor in achieving balance. Resources must be allocated to achieve a required level of capability with acceptable risk. A third factor is the amount of resources—rarely enough to accomplish everything with ease.

2.1.4 Flexibility

Flexibility is a characteristic of the acquisition strategy related to the ease with which changes and failures can be accommodated without significant changes in resource requirements. A strategy that allows for no change in approach is one that is destined to be challenged by events. As with the other characteristics discussed, there rarely is a single measure that can be used to quantify flexibility. One useful analysis approach can be called "what if?" —a form of contingency planning. Examples are:

- What if a drop-out occurs with one development contractor?
- What if the technical development of the XYZ component fails?
- What if a new technology becomes available?
- What if Congress cuts the program budget by 15 percent?
- What if the only capable contractor does not modernize its plant or equipment?
- What if a certain activity is completed six months later than planned?

Through such analyses, the PM can identify areas where flexibility is needed as well as measures necessary to provide "back-up," or alternative approaches to meeting objectives.

One of the most predictable occurrences in an acquisition program is change. Flexibility enables the PM to deal with change—to bend but not break. Without flexibility, changes can throw a program out of balance, leading to instability, unrealistic approaches, insufficient resource allocations, and intolerable management problems.

As indicated in the discussion of stability, those who review a program should be given a strong feeling that the acquisition strategy is directed toward successful accomplishment, with all major areas addressed. However, that does not mean that all approaches should be so firmly fixed that changes or failures cannot be accommodated. Identifying the areas where change or failure is possible, and employing approaches to deal with them are signs of good strategic planning. Unfortunately, some reviewers may insist on a strategy that excludes such possibilities, and frequently there are pressures against maintaining "reserve resources." If the nominal schedule estimates indicate a five-year development, the user may insist upon that target, even if the associated schedule allows no "slack" for dealing with any significant problems.

The first step in developing a strategy with sufficient flexibility, of course, is to identify areas in which there is a significant probability that changes or failures could occur. Not everything can be covered; otherwise the strategy becomes so flexible that it offers no firm basis for proceeding. One might adopt the approach that any significant potential change or failure with a subjective probability of occurrence of 20 percent or more should be addressed through a flexible strategy. This type of approach provides a direct lead-in to risk analysis which is addressed in paragraph 2.1.5 below.

Seven examples of ways to achieve program flexibility are presented below.

- **Requirements Flexibility.** Work closely with the user/user representative and comply with Department of Defense (DoD) 5000.2-R provisions for evolutionary requirements generation. This will allow for flexibility within the Operational Requirements Document (ORD) and enhance the potential for tradeoffs.

- **Contract flexibility.** Contracts can be written to provide needed flexibility in areas of uncertainty, reducing potential risk for both the government and the contractor resulting from changes. One common example is the use of price-escalation indices to adjust for economic changes. Another example is a variable pricing provision related to varying quantities.

- **Functional Flexibility.** Ideally, the acquisition strategy and supporting plans should be flexible enough to accommodate inevitable personnel turnovers, and allow for varying preferences in tactical implementing procedures on the part of new managers.

- **Funds Management.** As a general rule, the PM should not firmly allocate all resources at the start of a funding period. The maintenance of some unallocated funds (management reserve) provides a degree of funding flexibility.

- **Preplanned Product Improvement (P3I).** In technology areas of high risk and uncertainty, it may be prudent to plan for block changes of known emerging technology through the P3I approach.

- **Design Flexibility.** Since approximately 60 percent of the life-cycle cost (LCC) of a system is due to logistics support considerations, and approximately 30 percent is due to production considerations, each design should reflect an optimum balance among performance, producibility, and logistic supportability.

- **Evolutionary Acquisition (EA).** EA is an alternative approach that can be applied to weapon system and/or automated information system development. It entails plans for development of the core system (e.g., the prime mover or platform), together with a supporting strategy to achieve operational requirements via an incremental development process. Refer to the *Joint Logistics Commanders Evolutionary Acquisition Guide.*

2.1.5 Managed Risk[3]

Risk management is concerned with the identification of uncertainties that threaten cost, schedule, and performance objectives, and the development and implementation of actions to best deal with those uncertainties within established limits. Every program is subject to uncertainties that may result in failure to achieve cost, schedule, or performance objectives. Exposure to these adverse possibilities constitutes acquisition risk.

Sources of acquisition risk may appear endless to the PM. They can generally, however, be grouped into external and internal categories.

External risks originate from factors usually outside the control of the PM, and they are often associated with those requirements and constraints that define the program limits. They include:

[3] The information in this section generally follows the procedures and philosophy stated in the *AFMC Acquisition Risk Management Guide.*

- **Threat and Requirements.** Changes in the threat or a poorly defined requirement can result in redefinition of program performance objectives.

- **Funding.** The acquisition strategy is developed based on an assumption of a certain level of funding. Significant changes in funding levels can force stretch-outs, performance reductions, or worse case, cancellation.

- **Contractor.** Programs are subject to adverse impact when events such as labor strikes or financial difficulties affect a contractor's ability to function.

- **Politics.** PMs may receive direction from external sources (service headquarters, the Office of the Secretary of Defense (OSD), Congress, etc.) that impose certain cost and/or schedule constraints, which in turn will significantly increase the risk of meeting program objectives.The PM must understand how, where, and to what extent such directions impact program risks.

- **Acts of Nature.** Violent weather during key events in the acquisition cycle, earthquakes, fire, etc., all are certainly outside the control of the PM.

Internal Risks are those over which the PM has more direct control. They result from decisions made within the Program Management Office that affect cost, schedule, performance, and technical approaches to be used when the acquisition strategy is developed or modified. They include:

- **Requirements.** Ill-defined or changing requirements create program risk, and this risk is particularly acute in the area of software development. Prototyping and other internal actions by the PM can mitigate the risk or the impact of the risk.

- **Technology.** Technology risks result from the use of immature technologies to strive for previously unattained performance levels. The more the program incorporates immature technology, the greater the uncertainty of cost, schedule or performance projections.

- **Design and Engineering.** This category encompasses risks associated with the ability to translate technological capabilities into reliable hardware and software configurations.

- **Manufacturing.** Manufacturing risks are associated with the ability of the government,[4] and/or the contractor, to build the designed system to required performance and quality standards.

- **Support.** Support risks are associated with achieving reliability, availability, and maintainability objectives.

- **Cost and Schedule.** These risks entail the accuracy of the cost and schedule estimating process, along with their supporting assumptions. Risks are also infused into the schedule because of a critical path, a singularly constraining event, or a high level of concurrency.

- **Modeling and Simulation.** These risks are associated with the inability of a model or simulation to fully capture and emulate the performance characteristics of the system or component under development.

Since program risk is directly related to uncertainty in the program's ability to meet cost,

[4] The government may be directly involved in production via a government facility or indirectly through the establishment of performance standards in a solicitation.

schedule, and performance objectives, it can only be measured relative to these objectives, and within the context of the program's acquisition strategy. Changes to the strategy will generally result in a change to the level of risk. Thus the acquisition strategy should be developed and continually updated with these program risks in mind, and it should form the basis for an effective risk management program.

2.2 IDENTIFICATION/DESCRIPTION OF CRITICAL ELEMENTS/ OPTIONS OF AN ACQUISITION STRATEGY

A major function of the acquisition strategy is to document the ground rules and assumptions under which the program was started, and by which future decisions will be gauged. The acquisition strategy, as stated in DoD 5000.2-R, should become increasingly more definitive over time in describing the relationship of essential elements of a program. In this context, such elements include open systems; sources; cost, schedule and performance risk management; CAIV; contract approach; management approach; environmental, safety and health considerations; modeling and simulation approach; warranty considerations; and government property in the possession of contractors consideration. This list is not all-inclusive, and the acquisition strategy should address other major initiatives that are critical to the success of a given program. The following 11 paragraphs offer comment on several of the previously noted essential elements plus comments on other areas for consideration. An effort should also be made to minimize inevitable redundancy with other program documentation.

2.2.1 Mission Need

For each Mission Need Statement (MNS) receiving favorable consideration at Milestone 0, as reflected in an Acquisition Decision Memorandum (ADM), the user or user's representative plays a crucial role in preparing for program milestone reviews. Prior to Milestone I and each subsequent milestone, the role is that of translating the broadly-stated need into quantified operational performance parameters. This is accomplished through development and revision of the ORD. As noted in DoD 5000.2-R, these parameters are to be stated as Objectives and Thresholds. They will be displayed in several program documents and will serve as a basis for cost-schedule-performance tradeoffs. A well-defined acquisition strategy serves as a guiding compass in the tradeoff analyses.

2.2.2 Contracts

The strategy should address the types of contracts that are planned for succeeding phases of the program, together with types of contract incentives and the incentive structures. All contemplated deviations and waivers should be addressed. The content of this section may be liberally used in the Acquisition Plan (AP), which is a companion and supporting document.

2.2.3 Test and Evaluation (T&E)

The strategy should address key aspects of the T&E approach that will require special management focus by the PM in order to reduce program risk. The T&E portion of the strategy is concerned with the type, amount, and timing of testing, with sufficient detail to provide a strategic outline for those who develop the Test and Evaluation Master Plan (TEMP). A few example topics are: critical technical parameters, critical operational issues, critical facility requirements, special test resources, live fire testing, and/or test range scheduling issues.

2.2.4 Technology

The technology portion of the strategy should address the transition of critical technologies

that must be applied to the developing systems, as well as the strategies to reduce technological risk, with sufficient detail to provide a strategic outline for those who develop the systems engineering plan. Examples are: technology demonstration programs, P3Is, and/or the utilization of non-developmental items (NDIs) (with emphasis on commercial items) to reduce technological risk. This portion of the strategy should also address the key aspects of the software development approach, identify the mission critical computer resources, and identify related planning and support issues.

2.2.5 Software Development

The acquisition strategy should address key aspects, including risks, of the proposed software development approach. It should state how the chosen software development approach supports the system-level acquisition strategy.

2.2.6 Logistics Support

The strategy should address key aspects of the Logistics Support (LS) program which will require special management focus by the PM in order to reduce program risk, providing sufficient detail to act as a strategic outline for those who develop the support plan. In this regard, logistic support should be a performance requirement in the solicitation and the contract, like almost every other program contract item including spare parts. Place the burden on the contractor to respond to interchangeability; interoperability; and form, fit, and function requirements. A few of the possible topics for inclusion in the acquisition strategy are: support concept; site survey; interim contractor support; test equipment; and/or maintenance and operator training.

2.2.7 Production

The production portion of the strategy is concerned with ensuring the contractor's design is producible and that timely industrial capability will exist to provide the hardware (and associated software) within stated goals. This planning should also provide a strategic outline for those who develop the manufacturing/production plans. Possible issues for inclusion in the strategy are: establishing feasibility, assessing risks, identifying capable manufacturers and manufacturing technology needs, capabilities of the industrial base, availability of critical materials, and the transition from development to production. Further issues are: the production processes, quality assurance procedures, personnel, and facilities. Strategy alternatives may include phased procurement, low-rate initial production, productivity enhancement, and production concurrency with testing.

2.2.8 Risk Management

As noted in Section 2.1.5, program risk is a measure of the probability and consequence of not achieving a defined program goal. Risk assessment is the underlying analysis approach for acquisition strategy development. It provides one basis for determining conformance of the four previously noted criteria—realism, stability, resource balance, and flexibility. In fact, it can be argued that the four criteria are elements necessary to minimize program risk through the acquisition strategy.

Office of Management and Budget (OMB) Circular A-11 (superceding OMB A-109), DoD Directive (DoDD) 5000.1 and DoD 5000.2-R specifically direct that the risk issue be addressed. However, risk is not always easy to assess, since the probability of failure and the consequence of failure are often not exact, measurable parameters and must be estimated by statistical or other procedures. While formal risk analysis procedures deal with the "known knowns" and "known unknowns," there is also the issue of the "unknown unknowns." Here, only qualitative assessments are usually

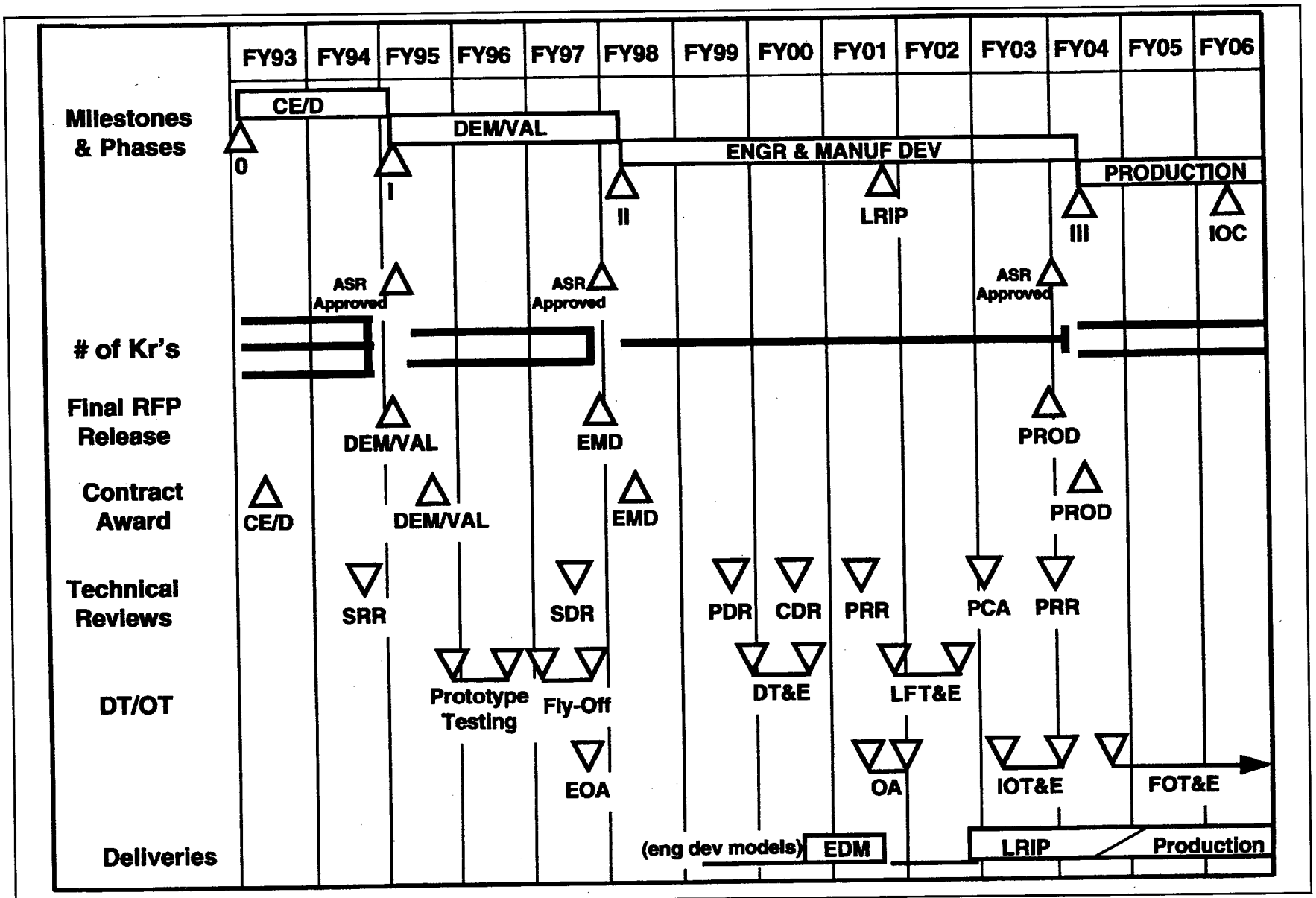


Figure 2-1. Program Structure (Example)

possible. Yet, accepting this limitation, a well-reasoned risk assessment dealing with the "known unknowns" provides a structure for selecting strategy alternatives and should be a major element in the decision making process.

Five references on risk assessment procedures that provide more specific detail are:

- *Risk Management – Concepts and Guidance*, May 1999, Defense Systems Management College, Ft. Belvoir, Va.

- Kockler, Frank R., Thomas R. Withers, James A. Poodiack, & Michael J. Gierman, *Systems Engineering Management Guide*, January 1990, Defense Systems Management College, Ft. Belvoir, Va.

- Air Force Materiel Command (AFMC) Pamphlet 63-101 of 9 July 1997, subject: Risk Management.

- Office of the Assistant Secretary of the Navy (RD&A) publication NAVSO P-3686, subject: Top Eleven Ways to Manage Technical Risk of October 1998.

- Johnson, Norman E., Risk in the "Acquisition Process – A Better Concept," *Program Manager*, Vol. XXIII, No. 5, pp. 39-41, Defense Systems Management College, Ft. Belvoir, Va.

2.2.9 Program Management

The strategy should reflect the Integrated Product and Process Development (IPPD) Process. It should also describe the key aspects of the program management structure (i.e., key events and related schedule) designed to reduce program risks, in sufficient detail to act as a strategic outline for the PM to develop a meaningful program management plan. Example topics include joint program aspects, matrix support, IPTs, total quality management, laboratory support, and planned changes to program office structure at specific points during the life of the acquisition program. The strategy should include the planned delineation between government and contractor responsibilities, e.g., government furnished equipment, information, and property; system integration; system testing, etc.

2.2.10 Funding

The strategy should describe the principal source of funds for development, production and fielding. Other potential topics include applicable joint funding agreements, highlights of the affordability study, and known funding or affordability constraints. The description should include the planned annual funding totals, by appropriation, for the prior year, current year, Future Years Defense Program (FYDP) and cost to complete. Affordability analyses will run to the end of production.

2.2.11 Structure and Schedule

The structure and schedule portion of the acquisition strategy must define the relationship among acquisition phases, decision milestones, solicitations, contract awards, systems engineering design reviews, contract deliveries, T&E periods, production releases, and operational deployment objectives. It must describe the phase transitions and the degree of concurrency entailed. It is a visual overview and picture presentation of the acquisition strategy. In accordance with DoD 5000.2-R, the program schedule and structure must be depicted on an event-driven time line diagram similar to the example shown in Figure 2-1.

2.2.12 Life Cycle Cost

The concept of CAIV must be used in establishing the acquisition strategy. Per DoD

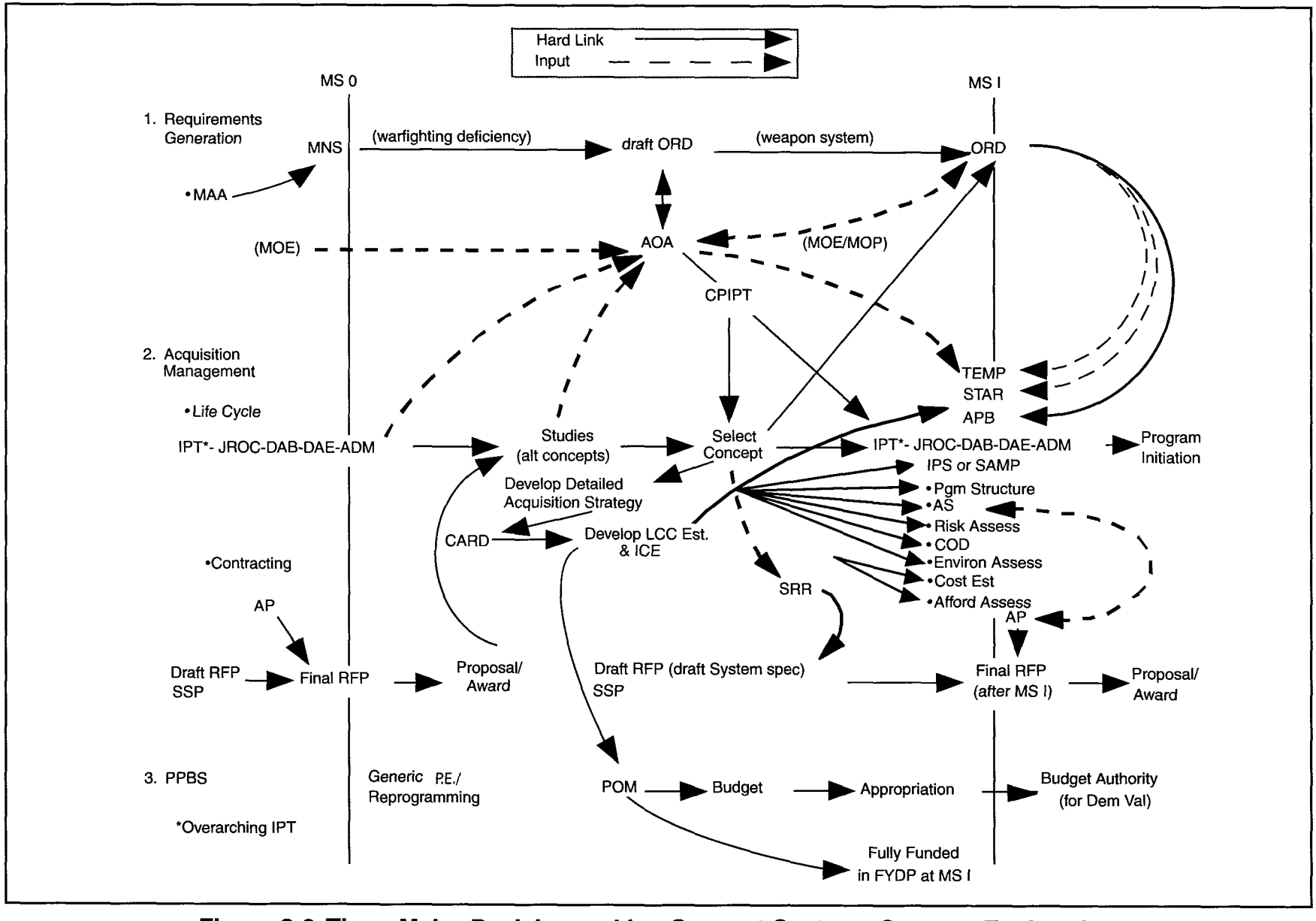


Figure 2-2. Three Major Decision-making Support Systems Concept Exploration

5000.2-R, the acquisition strategy shall address methodologies to acquire and operate affordable DoD systems by setting aggressive, achievable cost objectives and managing achievement of these objectives. Cost objectives shall be set to balance mission needs with projected outyear resources, taking into account anticipated process improvements in both DoD and defense industries.

A strategy that considers the total cost to the government over the entire cradle-to-grave life cycle of the system is necessary to provide balance and perspective to the program in consideration of the performance and schedule requirements to avoid suboptimization. In this regard, program managers are responsible for reducing DoD Total Ownership Cost (TOC) for their systems. However, their primary focus should be on one of the many dimensions of TOC-Defense System TOC. This is defined as Life Cycle Cost (LCC) per DoD 5000.4M.[5]

2.3 RELATIONSHIP TO OTHER DOCUMENTS

Documents which strongly influence the development and update of the acquisition strategy include the DoD 5000 series, OSD policy statements, federal law, the DoD Strategic Plan, the MNS, the ORD, the Defense Planning Guidance, the Program Objectives Memorandum, and the System Threat Assessment Report. The acquisition strategy in turn influences a major portion of the program documentation including the documents listed in Section 4.3.2 of this Guide. Figure 2-2 shows some of these planning documents and their interrelationships. Also, Figure 2-2 reflects the interactions of the three major decision-making support systems leading to program initiation. Over time, these plans become a means for coherently executing the acquisition strategy.

The acquisition strategy is fully documented in whatever Milestone Review documentation package is agreed upon by the PM and Milestone Decision Authority (MDA). One or more portions of the acquisition strategy are often reflected in other program-supporting documentation.[6]

[5] Under Secretary of Defense (Acquisition and Technology) Memorandum of 13 November 1998, Subj: Definition of Total Ownership Cost (TOC), Life Cycle Cost (LCC), and the Responsibilities of Program Managers.

[6] Under acquisition reform the program documentation requirements are significantly reduced, varying from program to program and among the three major DoD Components.

3

ACQUISITION STRATEGY DEVELOPMENT AND DOCUMENTATION

3.1 INTRODUCTION

Acquisition strategy development is a logical, systematic way of transforming an operational mission need into a comprehensive, top-level plan to guide the acquisition program team in satisfactorily fulfilling the mission need. The development process involves a series of steps with many iterations that consist of identifying, analyzing, and resolving issues related to the essential elements (identified in Chapter 2) of an acquisition strategy.

The acquisition strategy is developed during the Concept Exploration (CE) phase of the acquisition cycle. The principles applicable to the Integrated Product and Process Development (IPPD) concepts, Integrated Product Teams (IPTs) and the reengineered acquisition oversight and review process will be used where it makes sense. The development effort may take place prior to the formal establishment of a program office and assignment of a Program Manager (PM). Thus, the task may fall on either a special task force/group appointed following Milestone 0, or the initial program office cadre assigned by the Service in advance of program initiation. The initial strategy covers the entire acquisition cycle, providing substantial detail on the events of the program phase following the next milestone review, and less detail on the subsequent program phases. After the initial acquisition strategy is approved, it is updated, as necessary, throughout the system acquisition cycle. The acquisition strategy is part of the program documentation required at each milestone review after Milestone 0. As noted in the *Defense Acquisition Deskbook*, "The PM may choose to develop the acquisition strategy as a stand-alone document, or he may choose to incorporate the acquisition strategy into a multi-purpose document (e.g., an Army Modified Integrated Program Summary (MIPS), a Navy Master Acquisition Program Plan (MAPP), or an Air Force Single Acquisition Management Plan (SAMP)). In the event the PM chooses to incorporate the acquisiton strategy into such a multi-purpose document, there should be a specific section of that document dedicated to describing the programs's acquisition strategy and titled "Acquisition Strategy." The Defense Acquisition Executive (DAE) does not approve "MIPSs," "MAPPS," or "SAMPs." Accordingly, such a multi-purpose document must readily identify the Acquisition Strategy that the PM desires the DAE to approve."[1]

The remainder of this chapter includes sections on the acquisition strategy development process; the product (the acquisition strategy), its documentation, approval, and flow down to other program plans; and analysis tools that can be used in acquisition strategy development.

[1] *Defense Acquisition Deskbook*, Acquisition Strategy Discussions.

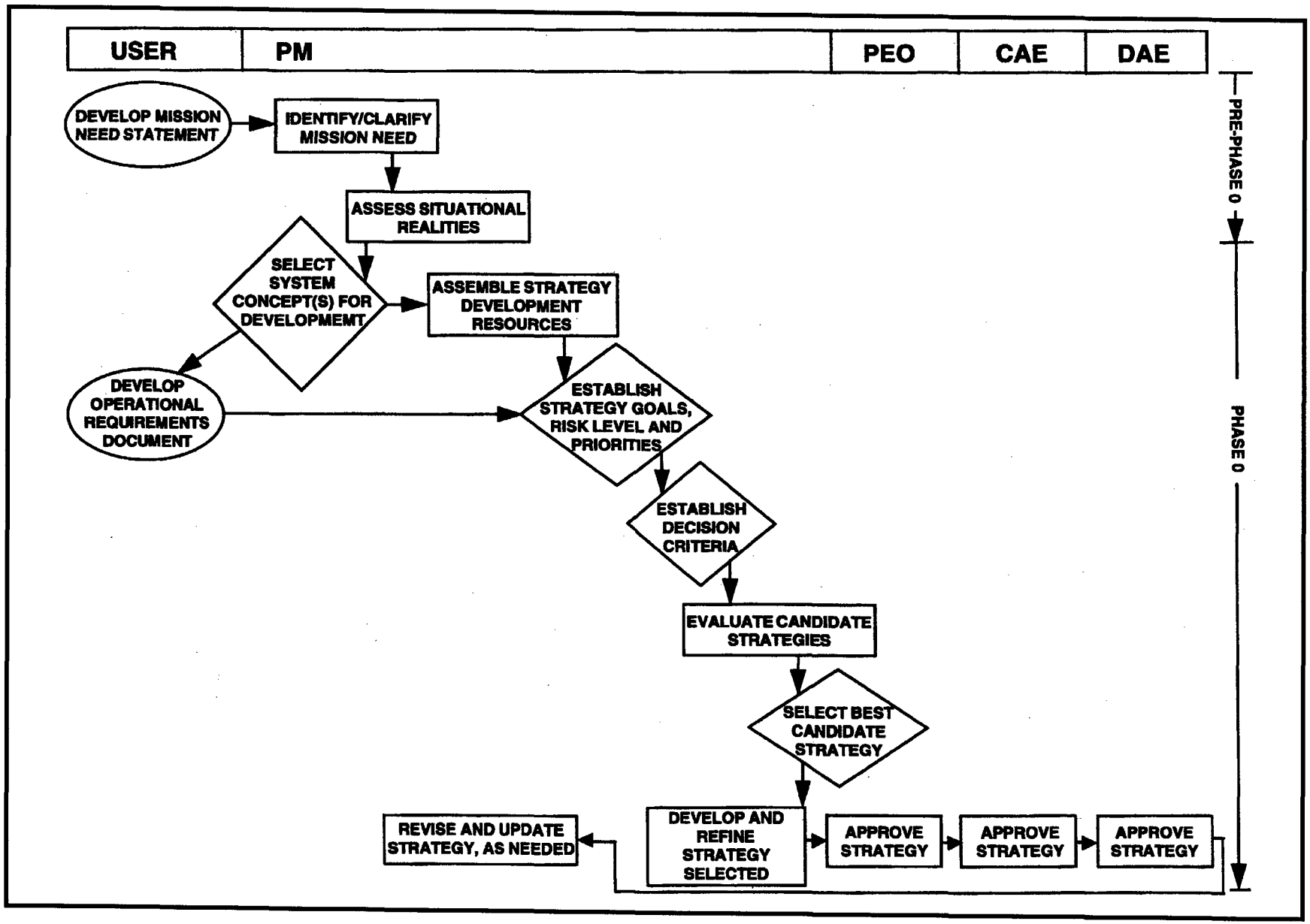


Figure 3-1. Acquisition Strategy Development Process

3.2 ACQUISITION STRATEGY DEVELOPMENT PROCESS

Sections 3.2.1 and 3.2.2 below describe the general process and the detailed process for developing an acquisition strategy.

3.2.1 General Process

This section presents a process that can be used to develop an acquisition strategy. The process consists of logically and systematically completing a number of steps beginning with identifying and clarifying the mission need and ending with gaining approval of the selected acquisition strategy. Completing each step involves identifying, analyzing, and resolving numerous issues related to the elements of an acquisition strategy by using problem-solving and decision-making tools and techniques.

One way to structure the acquisition strategy development process is to follow the sequence of steps shown in deployment flow chart format, Figure 3-1. Note that the figure displays the acquisition strategy development and approval activities, together with the office responsible and approximate position for each activity in the acquisition strategy development process. Not shown are the iterative loops performed during the process due to specific issues addressed, and trade-off decisions made. The chart also shows the individuals who are the final decision authorities for each step in the case of an Acquisition Category (ACAT) I program. Of course, other valid methods of developing a program acquisition strategy can be used as long as they provide for comprehensive treatment from a system perspective of how the mission need will be satisfied.

Software is available to aid in the preparation of an acquisition strategy. The *Defense Acquisition Deskbook*, Information Structure section, part 2.5 Acquisition Planning and Risk Management, addresses the acquisition strategy. A generic outline of an acquisition strategy is provided, acquisition strategy related software is referenced, and numerous acquisition strategy topics are discussed.

3.2.2 Detailed Process

The following detailed process of developing an acquisition strategy is based on the steps shown in the deployment flow chart, Figure 3-1. By using this logical, systematic process, the criteria of realism, stability, resource balance, flexibility, and managed risk can be integrated into the acquisition strategy. The acquisition strategy development process includes the following steps:

- Identify the mission need.
- Assess the situational realities.
- Select system concept(s) for development.
- Assemble strategy development resources.
- Establish strategy goals, risk levels, and priorities.
- Establish decision criteria.
- Identify specific candidate strategies.
- Evaluate candidate strategies and select best one.
- Further develop and refine selected strategy.

These steps are discussed in turn in the following subsections.

3.2.2.1 Identify the Mission Need

- What is the requirement?

- What is the urgency?

- How is the system to be used?

The primary goal in the development of an acquisition strategy should be to minimize the time and cost of satisfying an identified, validated *need* consistent with common sense, sound business practices, and the basic policies established by Department of Defense (DoD) Directive (DoDD) 5000.1 The mission need is the consequence of a performance deficiency in current or projected capabilities, or of a technological opportunity to establish new or improved capabilities. It must be certified by validation and approval authorities. The Mission Need Statement (MNS) is expressed in broad operational terms as determined by the user and shall identify and describe the mission contained in the DoD Strategic Plan. The strategy developer must clearly understand the mission need and ensure that it is well articulated to all participants in the acquisition process. Reference should be made to Chairman of the Joint Chiefs of Staff Instruction 3170.01 of 13 June 1997.

The PM or the leader of the pre-Milestone I task organization (henceforth also referred to as the PM) should also review and analyze other documents related to the MNS, such as the threat analysis studies, and provide feedback to the user or user's representative. The PM should also attempt to establish the approximate priority of the need, and later the program, within its own Service and DoD. This information establishes a decision framework that will enhance strategic trade-off.

3.2.2.2 Assess the Situational Realities

- What is the threat reality?

- What is the economic environment?

- What are the political realities?

- What is the program's relationship to other programs?

- What are the technological opportunities?

- What are the Cost As an Independent Variable (CAIV)-driven cost and performance objectives along with resulting schedule realities?

- What are the review and documentation realities?

The situational realities faced by the program include the system-related performance, cost, and schedule requirements; the general review requirements and procedures associated with the DoD acquisition process; the impact of other programs' acquisition strategies; completed or pending studies of topics related to the acquisition strategy; and the resources (time, money, and experienced people) available to complete the strategy development.

Each program's strategy development must proceed in its own particular acquisition environment. The PM must know where the program stands in that environment at any particular time. Some programs may have strong documented support from the beginning, with relatively few disturbing influences to hinder them. However, most programs have critics with their own audits and reports. There may be segments of Congress that oppose the program from a need, financial, or political viewpoint. A program may also have opponents within the Office of the Secretary of Defense (OSD), the other Services, or even its own Service, who have, or believe they have, valid reasons for their positions. Within DoD, General Accounting Office (GAO), Congressional Budget Office (CBO), etc., audit reports and estimates may exist that take issue with a strategy element within the program. For example,

Table 3-1. Resources for Acquisition Strategy Development

- Acquisition Strategy Development Funding and Time
- Facilities and Management Information Systems
- Mission Analysis Studies
- Concept Study Results
- Cost, Schedule, Technology Studies, Audit Reports (pro and con)
- Strategy Development Team
  - PM
  - Technology Manager
  - Business Manager
  - Logistician
  - User
  - Special Consultants
  - Contracting Officer
  - Others, as appropriate

existing contract relationships may be viewed in a negative context by an OSD office as opposed to the view by the sponsoring Service; or there may be a disagreement on Service compliance with a policy or rule by the Inspector General (IG) or a single member of Congress. The PM, with a full understanding of how the program fits into the national objectives and DoD priorities, should work with the operational users, OSD and Service Staffs to do all that is legitimately proper to ensure the program's success. The development of an effective acquisition strategy, that considers situational realities, is a key way to counter opposition and enhance the likelihood of achieving program goals.

3.2.2.3 Select System Concept(s)

- What concepts are possible?
- What concepts are feasible?
- Which concept(s) will most likely result in satisfying the mission requirements?
- What modeling and simulation can be used to aid system concept identification and selection?

Following mission need approval, appropriate consideration must be given to selection of a system concept using the conclusions flowing from an Analysis of Alternatives (AOA). These results must be subjected, in turn, to an affordability analysis. The end result provides top-level program requirements and the basis for the development of an event-driven acquisition strategy.

3.2.2.4 Assemble Strategy Development Resources

- What human resources are required?
- What funding resources are required?
- What information resources are required?
- What time commitment is required?

Strategy development will require resources — people, time, money, and information. Table 3-1 is a check list of resources that normally are

required for effective strategy development prior to Milestone I. Strategy must be developed in a concurrent, interactive, and integrated manner, rather than as a collection of separate inputs that can lead to functional discord. While all the participants in the strategy development are important, a seasoned technical manager and a knowledgeable and experienced business manager are key players, since the technical and business strategies often control critical accomplishments.

The user will have the knowledge, experience, and capability to ensure adequate consideration and compliance with operational concepts. User personnel are the PM's key link to the operational community, and therefore they must have a thorough working understanding of the mission needs, operator biases, and the acquisition process.

3.2.2.5 Establish Strategy Goals, Risk Levels, and Priorities

- How will this program be streamlined?
- How many sources will be used in each acquisition phase?
- What type of contracts will be used?
- How long will it take to award contracts?
- What are our cost goals?
- What type of testing and how much will be done and how long will it take?
- What logistics support approach will be used?
- What software development approach will be taken?
- Based on the system concept selected, what are the initial technical, cost, schedule, and support risks?
- What are the options for mitigating identified risk areas?

When the mission need is thoroughly understood, an assessment of the situational realities has been performed, and the resources for strategy development are available, the strategy development can actually begin. Program-specific strategy goals or objectives should be listed and prioritized (e.g., foster the use of performance specifications or seeking out solutions involving Non-Developmental Items (NDIs)). The difficulty of achieving each goal should be broadly assessed, as should the consequences of not achieving the goals. This assessment, together with the prioritization, provides a basis for assigning initial risk levels pending the program's development of a full risk management effort. At this stage, risk levels may be mostly qualitative (e.g., high, medium, and low) without full quantitative analysis of consequences and probabilities. However, to the extent feasible, the risk levels should be determined quantitatively. The initial risk levels then provide direction for developing strategy alternatives that can concentrate resources effectively.

3.2.2.6 Establish Decision Criteria

- What factors will be used?
- What weights, if any, will be assigned to each factor?
- What other considerations such as commercial items, open systems, etc., will be used in selecting the best candidate strategy?

Given that the program requirements have been established, priorities and initial risk levels assigned, decision criteria should be established for application to candidate strategies as they are being developed. The strategy development process can then be considered to be a classical

decision problem—that is, one of resource allocation with multiple objectives.

Such problems are not easily solved, especially when so many potential future impacts are unknown or not fully understood. It is here that the strategy criteria discussed in paragraph 2.1 become important for guiding the decision-making process, i.e., realism, stability, resource balance, flexibility, and managed risk. Based on these criteria, an assessment is made of how well the stated objectives/requirements can be met.

3.2.2.7 Identify Specific Candidate Strategies

- What are some specific candidate strategies?
- Do these specific candidate strategies satisfy the requirement?
- What are the schedule and documentation impacts of combining milestones or phases?
- What are reasonable time estimates for conducting developmental and operational testing?
- Are the candidate strategies affordable using CAIV?
- Do the candidate strategies adequately consider life cycle cost (LCC) (Defense Systems Total Ownership Cost (TOC))?

The strategy developer must identify candidate approaches for ensuring that each program objective and requirement is met. The selection of strategy alternatives should be driven by the mission need with consideration of the situational factors, goals, priorities and risk. Major DoD issues and alternatives applicable to an acquisition strategy are discussed in the DoD 5000 series directives. A list of acquisition-related terms and topics is provided in Appendix A. The list includes strategy-related items such as concept sources, design-to-cost, guarantees, incentives, leader-follower, phased acquisition, etc., one or more of which may be appropriate topics for inclusion in the acquisition strategy, depending on the specific nature of the acquisition program.

3.2.2.8 Evaluate Candidate Strategies

- Does each strategy satisfy the mission requirement and decision criteria?
- What are the advantages and disadvantages of each candidate strategy?

The decision criteria and decision model are applied to the identified candidate strategies. Such an evaluation cannot be performed in a mechanical fashion—the problems are complex, the uncertainties are substantial, and the criticality is high. While there are a number of mathematical, statistical, and economic tools available for such evaluation, judgment and experience must still play major roles. Equally important are information and data. These evaluations suggest *facts* necessary for complete assessment of alternative strategies are available. Sometimes relevant information is unobtainable. If information *crucial* to evaluating alternative strategies cannot be documented, then it must be *replaced by a valid assumption* and labeled as such. If an outcome will be unaffected regardless of whether or not and assumption turns out to be factually accurate then that assumption *is not* considered "valid." A limited discussion of analysis tools is addressed later in this chapter.

3.2.2.9 Select Best Candidate Strategy

- Which candidate strategy best satisfies the requirement and decision criteria?
- Which strategy is chosen?

Table 3-2. Strategy Decision Test

Criteria	Rating		Strategies					
			A		B		C	
	Initial (1)	Normalized (2)	Probability (3)	Weighted Score (2) x (3)	Probability (4)	Weighted Score (2) x (4)	Probability (5)	Weighted Score (2) x (5)
I	8	40	0.60	24	0.95	38	0.50	20
II	5	25	0.90	22.5	.50	12.5	0.95	23.75
III	5	25	0.80	20	0.90	22.5	0.60	15
IV	2	10	0.50	5	0.90	9	0.60	6
Total	20	100		71.5		82.0		64.75

The best candidate strategy will have many facets, each representing an aspect of the program that has been determined to be important in light of the operational requirement and the development, testing, production, and support requirements. A multi-attribute utility decision test, using a matrix such as the one shown in Table 3-2, can serve as a useful tool in the process of selecting the best candidate.

3.2.2.10 Refine Selected Candidate Strategy

When the evaluation is completed, and the preferred candidate strategy is selected, it is further developed and refined. The refinement activity includes a review and reassessment of all elements as they apply to the requirement as well as the aforementioned criteria of realism, stability, balance, flexibility, and managed risk. Other factors are considered, as appropriate, and the selected strategy is further tailored in accordance with DoDD 5000.1 and DoD 5000.2-R.

3.2.3 Services' Acquisition Strategy Development Approach

The military Services follow the overall DoD policy guidance on developing a system acquisition strategy. However, there is some variation in the way each Service executes the details of the acquisition strategy development process. The following sections describe some of those variations.

3.2.3.1 Army

The Army PM decides who will assist him or her in developing the program acquisition strategy. As the acquisition strategy is being developed, the cognizant materiel developer (MATDEV), the same as the PM for purposes of this Guide, coordinates the strategy thoroughly with agencies that support the MATDEV and agencies that will use and support the system when it is fielded. The MATDEV also coordinates the acquisition strategy with the combat developer (CBTDEV), training developer, independent testers and evaluators, logisticians, human system integrators, and matrix support organizations. Other system-

specific considerations may make further coordination advisable. These include, but are not limited to: training aids, devices, simulations, and simulators; night-vision and electro-optics devices; smart sensors or weapons system signatures; standard auxiliary power units; batteries; environmental control units; and shelters.[2]

3.2.3.2 Navy/Marine Corps

PMs for all Department of Navy (DON) programs shall develop an acquisition strategy implementing the requirements of DoD 5000.2R, paragraph 3.3. For ACAT IC, IAC, and II programs, the PM shall develop the acquisition strategy in coordination with the acquisition coordination team (ACT). For ACAT III and IV programs, the PM shall develop the acquisition strategy in coordination with the ACT, if one is established. An ACT is established by the PM, or other authority, in coordination with a cognizant Deputy Under Secretary of the Navy. The ACT, which is a DON-developed concept, in many respects performs the same roles that the overarching integrated product team (OIPT) and the working-level integrated product team (WIPT) perform for ACAT ID programs. The ACT does not replace the need for a functional IPTs, which is intended to address specific functional issues and which may be the only type of team associated with an ACAT III or IV program. The ACT is a team of stakeholders from the acquisition, requirements generation, and planning, programming, and budgeting communities who represent the Milestone Decision Authority's (MDA) principal advisors for a given program. The ACT will participate early and continuously with the PM to develop and implement the acquisition strategy and resolve issues at the earliest time and lowest level.[3]

3.2.3.3 Air Force

Within the Air Force, the acquisition strategy is developed and documented in the Single Acquisition Management Plan (SAMP) or Acquisition Plan (AP). The top-down process incorporates the guidance of an Acquisition Strategy Panel (ASP), consisting of a standing cadre of executive and senior advisors from functional disciplines. There are three levels of standing ASPs: Service Acquisition Executive (SAE) ASP; Senior ASP; and AFMC Center ASPs. The SAE ASP and Senior ASP members are appointed by the Assistant Secretary of the Air Force (Acquisition) (SAF/AQ). AFMC Center ASP members are appointed by the Center Commander (CC). In addition, each PM invites other individuals to participate based on their programmatic or functional expertise or on their vested interest as program stakeholders. The ASP process begins before acquisition strategies are submitted for approval but after a Program Management Directive (PMD) has been issued or if a program has experienced a major change or redirection. A normal sequence of events is as follows: the Program Executive Officer (PEO)/ Designated Acquisition Commander (DAC) and the program manager begin work on the SAMP or AP; an ASP meeting is called; a lessons-learned package is requested from the ASP secretariat; a time for an ASP meeting is coordinated with the ASP secretariat; the acquisition strategy is developed; the ASP meeting takes place; and the acquisition strategy is finalized and documented in SAMP or AP format.[4] Support to program teams developing performance based acquisition strategies

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[2] Army Regulation 70-1, Title: Army Acquisition Policy, dated: 15 December 1997, effective: 15 January 1998.

[3] SECNAVINST 5000.2B, dated 6 December 1996.

[4] *AFMC Financial Management Handbook.* Available at: http://www.afmc-mil.wpafb.af.mil/HQ-AFMC/FM/FMRS/frames/fmrsttoc.htm

and other program functions has been further enhanced by SAF/AQ. In April 1999, a new set of Lightning Bolts were announced including 99-1. This Lightning Bolt will expand upon the services provided by the existing request for proposals (RFP) Support Offices (RFPSOs) and enhance their role and performance throughout *all* pre-award activities. These activities are to include support to program teams in developing performance-based acquisition strategies, conducting program risk assessments, assisting in building streamlined RFPs, and consulting, training, and participating in source selections (Lightning Bolt 99-2). These organizations, redesignated Acquisition Support Teams (ASTs), will be accountable to the PEOs, DACs, and SAE for institutionalizing a performance-based business environment throughout ***all*** efforts that procure goods and services for the Air Force.[5]

3.3 PRODUCT

The documented acquisition strategy is the major *product* of the acquisition strategy development process. It consists of the program structure, acquisition approach, and major tradeoffs. The *product* must be more than a report of actions already taken and decisions already made in the program. It should not dwell on a detailed description of the system under development except as the description pertains to the acquisition strategy. It should summarize and/or discuss prior tradeoffs among cost, schedule, and performance that were made to bring the program to its current state, including a description of strategy changes that have taken place since initial approval. It should describe the risk reduction tools used in the past, and those preferred or planned for future use. Of equal or greater importance, it must provide the broad program strategy for future tradeoffs and program plans and actions, with special emphasis on the phase following the next major milestone review.

Likewise, the *product* must be more than a description or plan of contract types and contract actions past, present, and future. It must communicate the strategy to be followed in the technical development of the system, in the test and evaluation of the system, in development of the integrated logistics support system, in the program management function. Appendix B provides two sample acquisition strategies. They are the Joint Strike Fighter SAMP (see B-3) and the Joint STARS Common Ground Station SAMP (see B-27).

Following approval, the acquisition strategy should be widely disseminated, so that it may act as a key coordination tool, assisting the PM in the program control function. To best achieve this end, the PM should strive to develop the acquisition strategy as an unclassified document, if at all possible.

3.3.1 Documentation and Approval

An outline format for documenting an acquisition strategy is found in the *DoD Deskbook* at http://www.deskbook.osd.mil/. PMs are encouraged to tailor their acquisition strategy documentation as noted in Table 3-3 at the end of this chapter. A documented acquisition strategy, when properly tailored and streamlined to reflect the key elements of a specific program, will prove useful in conveying a broad master plan for the successful accomplishment of an acquisition program. (See the examples in Appendix B.)

The acquisition strategy is approved by the MDA. DoD 5000.2-R requires such approval *prior to issuance of the formal RFPs* for the next program phase.

[5] HQ AFMC/AQ memo of 17 March 1999, subj: AF Acquisition and Sustainment Reform '99 Lightning Bolts.

3.3.2 Flow Down

The level of detail included in the initial acquisition strategy should be sufficient to serve as a roadmap for the entire program throughout the acquisition cycle and to serve as a basis for development of functional plans such as the acquisition plan and the Test and Evaluation Master Plan (TEMP). This concept is discussed in more detail in Chapter Four.

3.4 ANALYSIS TOOLS APPLICABLE TO ACQUISITION STRATEGY DEVELOPMENT

This section addresses some of the analytical processes and tools and techniques that are useful for program management personnel in structuring acquisition strategies to support and feed into informed tradeoff decisions, given affordability constraints and the user's validated needs. Tradeoff decisions are, of course, made in the context of cost, schedule and performance.

In support of the following analysis tools, and as directed by the Deputy Secretary of Defense (DEPSECDEF), the acquisition strategy shall describe its Integrated Digital Environment (IDE).[6] Although still in its formative stages (July 1999), IDE is a cross-functional digital information infrastructure that supports a DoD acquisition program. It should be readily accessible by anyone who needs it, used at various organizational levels within government and industry, and support a range of acquisition management purposes. The IDE will be composed of various tools and processes that allow for the physical exchange of data, electronic delivery of data, shared databases, and offer support to both local and integrated workflow.

3.4.1 Risk Analysis

Risk analysis, as a continuing function, is required by the current 5000 series directives. The risks associated with a program as it approaches a milestone, and the adequacy of risk management planning, must be explicitly managed. A risk management program must be developed and executed by the PM. The references listed in paragraph 2.2.8 contain a number of tools applicable to risk analysis.

3.4.2 Cost Analysis

Cost analysis is performed to assess the resource implications associated with the various program alternatives. Such resource implications are used and further developed in performing the AOA.

In order to perform a proper analysis of cost of an acquisition program, it is necessary to understand the various types of costs and the relationships existing among those different costs. In this regard, the concept of LCC is extremely important. Life cycle cost includes all work breakdown structure (WBS) elements; all affected appropriations; and encompasses the cost, both contractor and in-house effort, as well as existing assets to be used, for all categories. It is the total cost to the government for a program over its full life, and includes the cost of research and development, investment in mission and support equipment (hardware and software), initial inventories, training, data, facilities, etc., and the operating, support, and, where applicable, demilitarization, detoxification, or long-term waste storage.[7] Life cycle cost and total ownership cost is discussed in paragraph 2.2.12.

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[6] DEPSECDEF memo of 2 July 1997 directing implementation of IDE by end of 2002; DoD 5000.2-R, paragraph 3.3.5.5; and DFARs 207.105.

[7] DoD 5000.4M, Cost Analysis Guidance and Procedures, December 1992.

There are a number of cost analysis and estimation procedures. A key element applicable to all procedures is the availability of comprehensive, relevant, and accurate data. Such data should include detailed descriptions of the system or process under evaluation; associated economic, situational, and environmental factors; and costs and associated information on similar systems.

There are four generic types of cost analysis/ estimation procedures, all of which are addressed in a variety of government, commercial, and professional association publications.

- **Bottom-Up.** Estimates are made at the lowest possible level of the system or process, and the engineering expertise of applicable organizations are used. These lower-level estimates are then aggregated and adjusted to account for such factors as integration, overhead, and administrative expenses. This technique requires fairly complete information at lower levels.

- **Analogy.** Current cost information on similar systems or processes is collected and modified as appropriate to account for variations from the system or process under evaluation.

- **Extrapolation.** Estimates are made by extrapolating from actual costs.

- **Parametric Analysis.** A broad base of applicable cost data is analyzed to develop relationships between cost elements and system or process characteristics. These are often called Cost Estimating Relationships (CERs).

All four methods can be used feasibly within a single program. When it can be applied, the bottom-up approach is usually the most accurate but also the most time-consuming and labor-intensive. The comparison methods (analogy and extrapolation) are often used to establish an initial baseline and to calibrate the other methods. The accuracy of parametric analysis depends on the data quality, the degree to which the CERs represent the instant case, and the strength of the derived relationships. This method is usually applied early in the program. Tools and techniques useful for cost analysis/ estimation are available in the DoD cost analysis community. In the area of software and software cost estimating, a wide range of useful Web sites are available at http://www.hill.af.mil and various tenant organizations. In addition, each of the Services maintains several cost-estimating Web sites easily found using most search capabilities.

http://www.dtic.mil/pae/
OSD Cost Analysis Improvement Group

http://www.ncca.navy.mil/index.html
Naval Center for Cost Analysis

http://www.ceac.army.mil/
Army Cost and Economic Analysis Center

http://www.saffm.hq.af.mil/
Assistant Secretary of the Air Force (Financial Management and Comptroller) SAF/FM

3.4.3 Schedule Analysis

In many respects the analysis of schedules has many of the characteristics of cost analysis. Data completeness, accuracy, relevancy, and quantity are important elements. Bottom-up, comparison, and parametric techniques are also applicable. For schedule analysis, there are a number of unique tools and techniques, including the following:

- Gantt and milestone charts.

- Line-of-balance (LOB) technique.

- Network scheduling.

- Time management techniques.

- Project management software applications.

Further information on scheduling tools and techniques can be found in the Defense Systems Management College's *Scheduling Guide,* May 1994.

3.4.4 Decision Analysis

Decision analysis is the process by which choices are made. Much theoretical work has been performed in developing methods to provide quantifiable measures for evaluating choices. With regard to acquisition strategy, the more sophisticated methods are usually limited because of the complex interactions (which make quantification difficult) and the data limitations that usually prevail. Nevertheless, the concepts of decision theory should be used in acquisition strategy development and execution to the maximum extent possible. A detailed description of the various decision analysis tools is beyond the scope of this Guide. The following is a listing of widely employed methods of analysis, that have proven to be useful in a broad range of DoD situations, and are generally understood by many in the defense acquisition community (see Hillier and Lieberman, below):

- **Statistical Analysis.** The most frequently used technique in this category is regression analysis which is employed for forecasting the expected value of a dependent variable, given the values of the independent variables. This method is used extensively in the area of cost and performance forecasting. Other statistical methods are probability theory, exponential smoothing, statistical sampling, and tests of hypotheses.

- **Modeling and Simulation (M&S).** This method is likely to involve the construction of a model that is largely mathematical in nature with individual elements whose behavior can be predicted, in terms of probability distributions, for each of the various possible states of the system and its inputs. The model is then activated by using random numbers to generate simulated events over time according to the appropriate probability distribution. The result is simulation of actual operations such as those involving a specific aircraft; and in the end, are nothing more or less than a relatively affordable technique of performing *sampling experiments* on a model of the system rather than on a yet to be built or fielded system. M&S shall be applied, in collaboration with industry, and as appropriate, in acquisition strategy preparation and throughout the system life-cycle.[8]

- **Mathematical Programming.** Linear Programming (not to be confused with computer programming) is the most widely used method within this group. A common application involves the general problem of allocating limited resources among competing activities in the best possible or optimal way. All the mathematical functions in the model are linear. The most important area of application is production management (product mix, allocation of resources, plant and machine scheduling, and work scheduling) followed by capital budgeting. Mathematical programming also includes a number of other methods, the most widely used of which are nonlinear programming and dynamic programming. Other examples include network analysis, game theory, and integer programming.

Other lesser used methods that tend to have specialized applications in areas indirectly

[8] DoD Regulation 5000.2-R, of 15 March 1996, with Change 4, paragraph 3.3.8.

supporting the PM can generally be grouped under the category of Probabilistic Models. These methods would include the stochastic processes, queuing theory, inventory theory, and the Markovian decision process.

Two excellent references on decision analysis, tradeoff analysis and related topics are *Introduction to Operations Research,* Fourth Ed., Hillier and Lieberman, Holden-Day, Inc., 1986; and, *Design to Reduce Technical Risk,* AT&T, McGraw-Hill, Inc., 1993.

Table 3-3.
Recommended Outline for the Acquisition Strategy Documentation

Consider The Following Outline As A Guide Or Model Only, To Be Streamlined and Tailored As Appropriate For Your Particular Program.

1. PROGRAM STRUCTURE (Not a history or weapon system description)

- 1.1 Planned Relationship among Acquisition Phases, Decision Milestones, Solicitations, Contract Awards, Systems Engineering Design Reviews, Contract Deliveries, T&E Periods, Production Releases, and Operational Deployment Objectives
- 1.2 Planned Degree of Concurrency and Phase Transitions
- 1.3 Planned Quantities to be Procured, by Fiscal Year and Phase (List)
- 1.4 Diagram of Program Structure and Schedule (See DoD 5000.2-R Appendix III, p. III-11)

2. ACQUISITION APPROACH

- 2.1 Overview
  - 2.1.1 Mission Need
  - 2.1.2 Program Management Plans
    - 2.1.2.1 Delineation of Government/Contractor Responsibilities
    - 2.1.2.2 Integrated Product/Process Teams
    - 2.1.2.3 Matrix Support
  - 2.1.3 Basic Acquisition Strategy Planned
    - 2.1.3.1 Planned Approach (subsections as applicable)
      - 2.1.3.1.1 Transition of Critical Technologies from Technology Demonstration Programs to Prototypes to Engineering Development Models
      - 2.1.3.1.2 New Development Program
      - 2.1.3.1.3 Non-Developmental Items
      - 2.1.3.1.4 Evolutionary Acquisition
      - 2.1.3.1.5 Preplanned Product Improvements
      - 2.1.3.1.6 Commercial Off-the-Shelf (COTS)
      - 2.1.3.1.7 Joint Program
      - 2.1.3.1.8 International Program
    - 2.1.3.2 Contracting Plans
      - 2.1.3.2.1 State Compliance with the Policy on the Use of Performance Specifications (Army Only)

Table 3-3. (continued)

2.1.3.3 Test and Evaluation Plans
2.1.3.4 Technology Plans
2.1.3.5 Logistics Support Concept/Plans
2.1.3.6 Production Plans
2.1.3.7 Description of Risk Management Program
2.1.3.8 Modeling and Simulation Program
2.1.3.9 Integrated Digital Environment (IDE) Plans

2.1.4 Funding Plans

2.1.4.1 Principal Source Used to Initiate Concept Studies
2.1.4.2 Joint Funding Agreements
2.1.4.3 Highlights of Affordability Study and CAIV based Objectives
2.1.4.4 Funding and Affordability Constraints
2.1.4.5 Chart of Planned Annual Funding Totals, by Appropriation

2.2 Streamlining Plans

2.2.1 Program Phases
2.2.2 Accommodation of Legislative Requirements
2.2.3 Documentation

2.3 Sources

2.3.1 Small Business and Small Disadvantaged Business
2.3.1.1 Prospective Sources of Supplies and Services
2.3.1.2 Concerns Regarding Labor Surplus Areas
2.3.1.3 Plans to Create or Preserve Domestic Sources
2.3.2 Contingency Support and Reconstitution Objectives
2.3.3 Industrial Preparedness Strategy
2.3.4 Relevant Capabilities of the Defense Industrial Base

2.4 Competition

2.4.1 Plan to Maximize Competition
2.4.1.1 Justification for Less than Full and Open Competition
2.4.1.2 Use of Repurchase Data to Increase Competition
2.4.2 Breakout Plans/Results of Detailed Component Breakout Reviews

2.5 Contract Types

2.5.1 Planned Contract Types Listed by Program Phase

Table 3-3. (continued)

2.5.2 Considerations of Risk Assessment and Risk Sharing

2.5.3 Incentive Structure

2.5.3.1 Contracts

2.5.3.2 Contractor Incentives to Improve Productivity

2.5.4 Deviations and Waivers

2.5.4.1 Existing

2.5.4.2 Contemplated

2.6 Planned Use of Fixed Price Contracts (Fixed price development contracts of $25 million or more or fixed-price type contracts for lead ships shall not be used without the prior approval of the USD(A&T))

3. MAJOR TRADEOFF DECISIONS

3.1 CAIV-based Objectives and Overall Tradeoff Strategy

3.2 Summary of Prior Tradeoff Studies

3.3 Decisions Required by the Milestone Decision Authority Prior to Release of the Formal Solicitation

3.4 Tradeoffs to be Included in the Solicitations.

4

EXECUTION OF THE ACQUISITION STRATEGY

4.1 GENERAL

This chapter focuses on the elements to be considered in acquisition strategy execution, the flowdown from the strategy to the "functional strategies" to the functional plans, revisions to the strategy, and deviations from the strategy. Figure 4-1 is an event sequence chart of the execution process. It represents the iterative process associated with implementing and modifying a continuously evolving acquisition strategy, which is the subject of Section 4.2. Conversely, the actions associated with deviation from an approved acquisition strategy are addressed in Section 4.3.

4.2 THE EXECUTION PROCESS AND FLOW DOWN

The acquisition strategy is managed through execution and control of the functional *plans*. The three functions of control—direction, detection, and correction—describe the activities that are included in strategy management. *Direction* is the process of using resources (e.g., people, dollars, time) to implement plans. *Detection* is accomplished through the use of tools (briefly addressed in Chapter 3) to compare actual with planned results. *Correction* follows detection in those instances where action is required, and plans are changed as appropriate. Detection, the link between direction and correction, should include among its tools a management information system (MIS) to provide systematic verification of internal (government) and external (contractor or other government agency) performance in implementing functional plans. Areas to be considered include cost control, schedule control, technical management, managed risk, and contract management. Program Managers (PMs) should ensure that their MISs and Integrated Digital Environment (IDE) are implemented early, and that they satisfy program office needs, the needs of other Department of Defense (DoD) offices with acquisition responsibilities, the needs of their contractors, and comply with statutory/Federal Acquisition Regulation (FAR) imposed reporting requirements.

Of the three general types of program documentation—requirements, decision, and functional—the acquisition strategy serves as requirements and decision documentation. It states what the PM believes must be accomplished to meet the stated objectives of the program, and it provides overall program direction. The acquisition strategy also serves as the source of objectives for functional implementation plans. It should not contain planning details but rather, should provide a clear understanding of the issues to be addressed throughout the life of the program. Thus, it can be characterized as a roadmap or "plan for planning."

Just as there is a flowdown from the system threat assessment, mission need statement and operational requirements document to the acquisition strategy, there is a very real flowdown from the acquisition strategy to functional

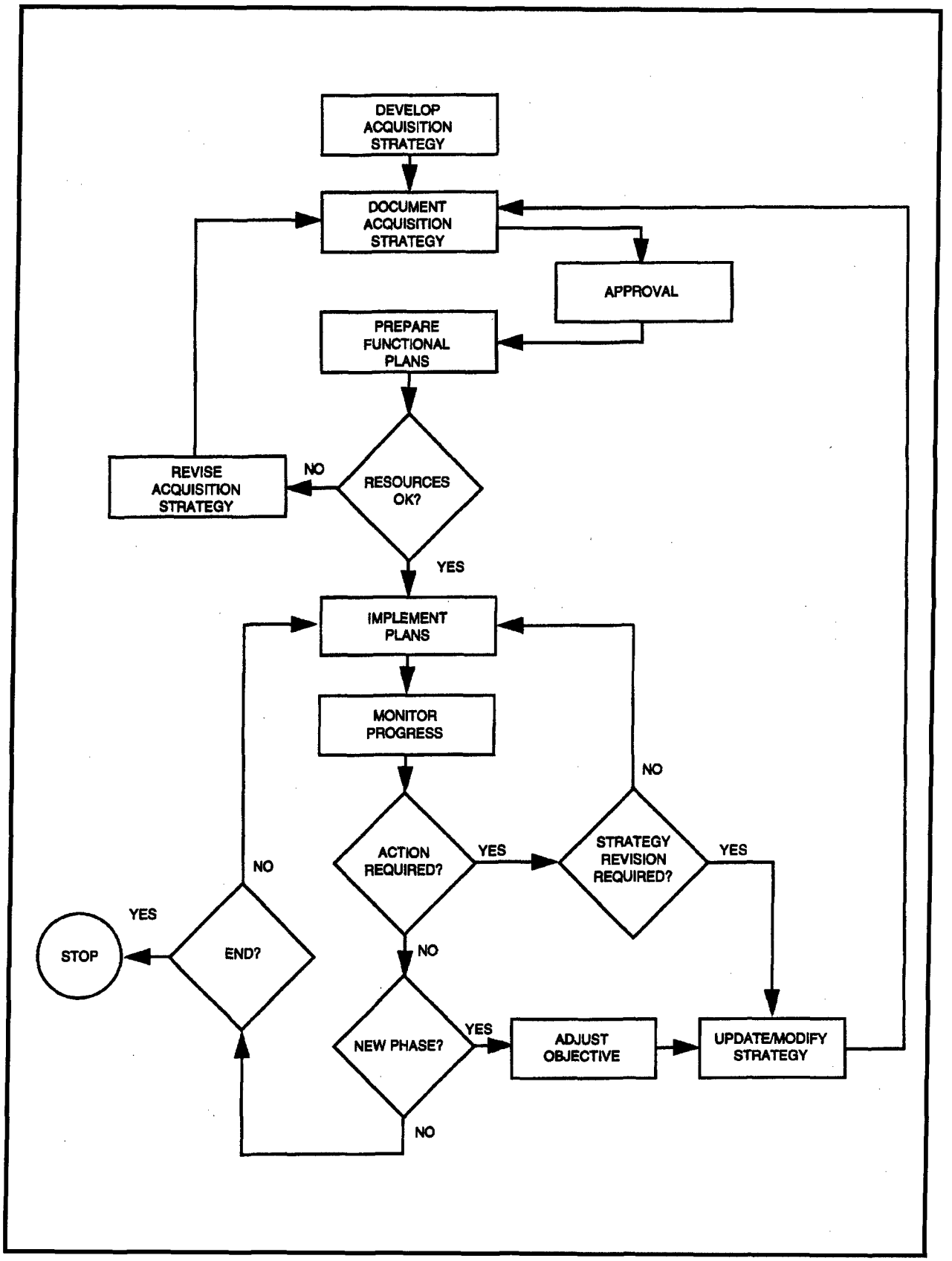


Figure 4-1. The Acquisition Strategy Development and Execution Process

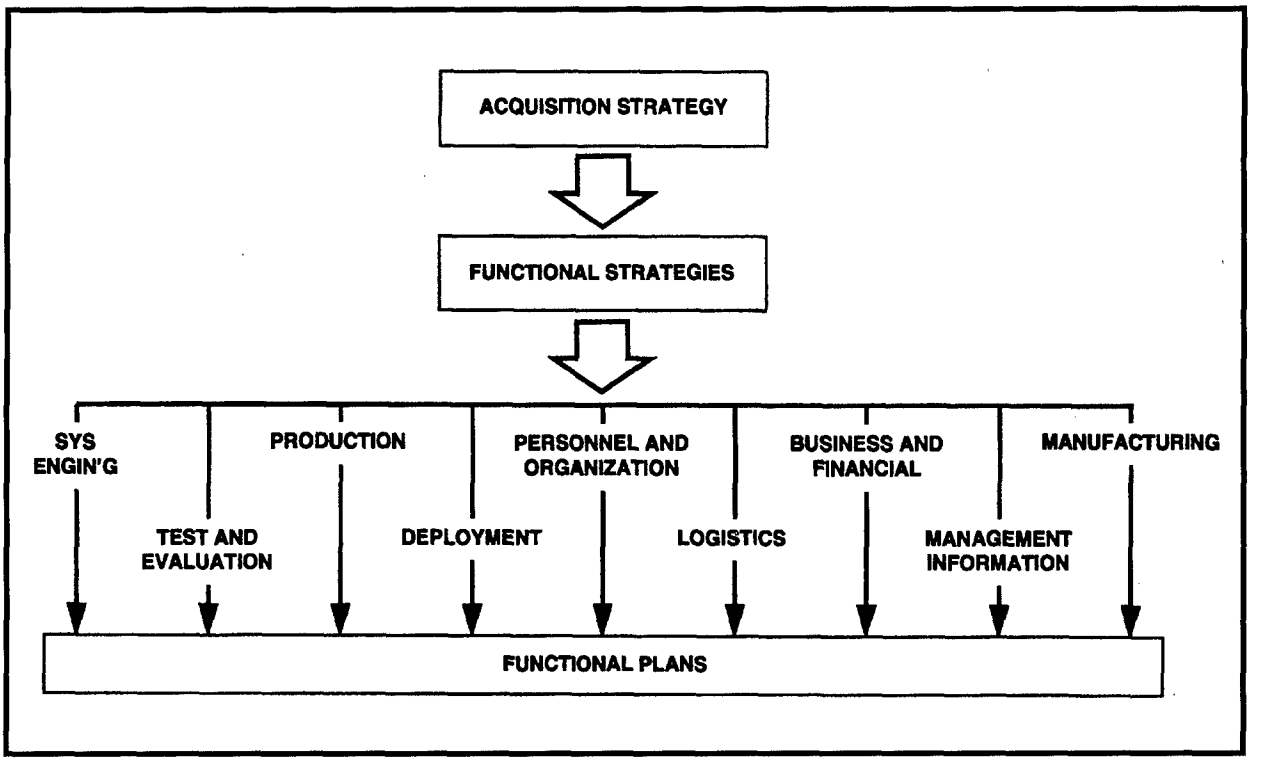


Figure 4-2. Flowdown of Acquisition Strategy to Functional Strategies and Plans

strategies and documented functional plans. Figure 4-2 shows "functional strategies" linking the acquisition strategy and the functional plans. Further reference to DoD 5000.2-R, will provide an overview of most of the required program documents including some of the functional plans. These required documents are divided into two categories, Milestone Documents and Periodic Reports. Included among the latter category is the acquisition plan. The acquisition plan is required by the FAR. Acquisition planning as documented in the acquisition plan is the responsibility of the PM with preparation of the plan usually being performed by the Contracting Officer. The acquisition plan must be approved before significant contractual actions are initiated. Although the acquisition plan is similar, in some respects, to the acquisition strategy, there is a fundamental difference; the strategy is broad and considers the main areas of the system life cycle, while the acquisition plan primarily addresses the contracting aspects of the program. The experienced PM will recognize that one of the advantages of an up-to-date acquisition strategy is that its information readily serves as the framework for the acquisition plan and the other functional plans. Please see footnote Number One in Chapter 1 of this Guide.There is no DoD-level rule that precludes the PM from preparing a single document to satisfy both the acquisition strategy and the acquisition plan requirements; in fact, FAR 34.004 requires that acquisition strategies prepared in accordance with FAR Subpart 7.1 "qualify" as the acquisition plan for a major systems acquisition.

4.3 DEVIATIONS FROM THE ACQUISITION STRATEGY

Even a good acquisition strategy, one which meets the criteria of realism, stability, resource balance, flexibility, and managed risk, is subject

to changing circumstances beyond the scope of the plans laid out in the strategy. One of the consequences of preparing a comprehensive, useful acquisition strategy is the near-certainty that future events will require a modification to the strategy. When the need is urgent, and program risks can be better managed through deviations from the strategy, such deviations are appropriate. Deviations invariably introduce new risk into the program, and thus the program risk analysis should be updated in light of the new circumstances.

4.3.1 Examples

A few of the more significant events which may require deviations from the acquisition strategy are:

- Significant change in procurement quantities.
- Significant change in top-level political support.

4.3.2 Action When Deviation Becomes Necessary

Deviations should be treated as interim actions dictated by pressing circumstances, and must be accompanied by actions to attain approval for an updated acquisition strategy from the Milestone Decision Authority (MDA) without delay. The series of program actions which are necessary to execute a deviation can be summarized as follows:

- Conduct a risk analysis to justify deviation.
- Obtain approval for the deviation from the Program Executive Officer/MDA.
- Execute the approved deviation in order to manage risk.
- Communicate the deviation to appropriate government and contractor team members.
- Prepare proposed change to the acquisition strategy, and other appropriate program plans.
- Submit proposed change for approval.
- Upon approval, promulgate the updated acquisition strategy, and other plans to appropriate government and contractor team members.
- Advise all functional principals to update any remaining functional plans in accordance with the new acquisition strategy. These plans may include the following:
  - Acquisition Plan.
  - Test and Evaluation Master Plan (TEMP).
  - Risk Management Plans.
  - Operational Support Plans.
  - Command, Control, Communications, Computers, and Intelligence (C4I) Support Plan.
  - Component Breakout Plans.
  - IDE Plan.
  - Other Plans, as appropriate.

Timely execution of this action sequence will ensure that all program team members and members of appropriate Integrated Product Teams are aware of the need to redirect their efforts to conform with the new acquisition strategy.

APPENDIX A
ACQUISITION RELATED TERMS

This appendix lists acronyms in Part I, and definitions of acquisition-strategy related words and phrases in Part II. A DSMC *Glossary of Defense Acquisition Acronyms & Terms* is available on-line from DSMC at: **http://www.dsmc.dsm.mil/** or may be purchased in various media from sources noted on the DSMC web site.

PART I – ACRONYMS

ACT Acquisition Coordination Team
ADM Acquisition Decision Memorandum
ACAT Acquisition Category
ACTD Advanced Concept Technology Demonstration
AOA Analysis of Alternatives
AP Acquisition Plan
APB Acquisition Program Baseline
AS Acquisition Strategy
ASP Acquisition Strategy Panel
AST Acquisition Support Team
C4I Command, Control, Communications, Computers, and Intelligence
CAIV Cost As an Independent Variable
CBTDEV Combat Developer
CE Concept Exploration
CER Cost Estimating Relationship
DAC Designated Acquisition Commander
DFAR Defense Federal Acquisition Regulation
DoD Department of Defense
DoDD Department of Defense Directive
DPG Defense Planning Guidance
DRI Defense Reform Initiative
DSAC Defense Systems Affordability Council
EA Evolutionary Acquisition
FAR Federal Acquisition Regulation
FAStA/FASA Federal Acquisition Streamlining Act
IDE Integrated Digital Environment

IPPD Integrated Product and Process Development
IPT Integrated Product Team
ITMRA Information Technology Management Reform Act
LCC Life Cycle Cost
LOB Line of Balance
LRIP Low Rate Initial Production
LS Logistics Support
M&S Modeling and Simulation
MAIS Major Automated Information System
MAPP Navy Master Acquisition Program Plan
MATDEV Materiel Developer
MDA Milestone Decision Authority
MDAP Major Defense Acquisition Program
MIPS Army Modified Integrated Program Summary
MIS Management Information System
MNS Mission Need Statement
NDI Non-Developmental Item
OIPT Overarching Integrated Product Team
OMB Office of Management and Budget
ORD Operational Requirements Document
OSD Office of the Secretary of Defense
P3I Preplanned Product Improvement
PEO Program Executive Officer
PL Public Law
PM Program Manager
RAM Reliability and Maintainability
RFP Request for Proposal
RFPSO RFP Support Offices
SAE Senior Acquisition Executive
SAMP Single Acquisition Management Plan
T&E Test and Evaluation
TDP Technical Data Package
TEMP Test and Evaluation Master Plan
TOC Total Ownership Cost
WBS Work Breakdown Structure
WIPT Working-Level Integrated Product Team

PART II – DEFINITIONS

Acquisition Category (ACAT). See Section 1.3, DoD 5000.2-R.

Acquisition Phase. All the tasks and activities needed to bring the program to the next major milestone occur during an acquisition phase. Phases provide a logical means of progressively translating broadly stated mission needs into well-defined system-specific requirements and ultimately into operationally effective, suitable and survivable systems. An example of an acquisition phase is Concept Exploration (DoD 5000.2-R).

Acquisition Plan. See footnote 1 of this Guide.

Acquisition Program Baseline (APB). See Section 3.2.2, DoD 5000.2-R.

Acquisition Strategy. See page 1 of this Guide.

Affordability. A determination that the life cycle cost of an acquisition program is in consonance with the long-range investment and force structure plans of the DoD or individual DoD Components.

Analysis of Alternatives (AOA). See Section 2.4, DoD 5000.2-R.

Automated Information System (AIS). A combination of computer hardware and software, data, or telecommunications, that performs functions such as collecting, processing, transmitting, and displaying information. Excluded are computer resources, both hardware and software, that are physically part of, dedicated to, or essential in real time to the mission performance of weapon systems (DoD 5000.2-R).

Competition. See Section 3.3.5.1, DoD 5000.2-3.

Component Acquisition Executive (CAE). See Section 1.3, DoD 5000.2-R.

Component Breakout. Execution of an acquisition strategy to convert some parts or system components from contractor furnished to government furnished. Rather than have the prime contractor provide from its sources, the government procures items directly, and provides them to the prime.

Concept Exploration. Known as Phase 0, it typically consists of competitive, parallel short-term concept studies. The focus of these efforts is to define and evaluate the feasibility of alternative concepts and to provide a basis for assessing the relative merits of these concepts at the next milestone decision point. See definition of Acquisition Phase above.

Cost As an Independent Variable (CAIV). See Section 3.3.4, DoD 5000.2-R.

Defense Acquisition Executive (DAE). For a detailed description, see Section 1.3, DoD 5000.2-R.

Integrated Digital Environment (IDE). See Section 3.3.5.5, DoD 5000.2-R.

Integrated Product and Process Development (IPPD). A management technique that simultaneously integrates all essential acquisition activities through the use of multidisciplinary teams to optimize the design, manufacturing and supportability processes. IPPD facilitates meeting cost and performance objectives from product concept through production, including

field support. One of the key tenets is multidisciplinary teamwork through Integrated Product Teams (IPTs) (DoD 5000.2-R).

Integrated Product Team (IPT). The Secretary of Defense has directed that the Department perform as many acquisition functions as possible, including oversight and review, using IPTs. IPTs operate under the following broad principles:

1. Open discussions with no secrets,
2. Qualified, empowered team members,
3. Consistent, success-oriented, proactive participation,
4. Continuous "up-the-line" communications,
5. Reasoned disagreement, and
6. Issues raised and resolved early. (DoD 5000.2-R). See Section 1.6, DoD 5000.2-R, for information concerning the inclusion of representatives from organizations other than the federal government.

Leader-Follower Concept. A government contractual relationship for the delivery of an end item through a prime or subcontract relationship or to provide assistance to another company.

1. Prime contract is awarded to an established source (leader) that is obligated to subcontract to and assist another source (follower).
2. A contract is awarded requiring the leader to assist the follower who has the prime contract for production.
3. Prime contract awarded to the follower for production; follower is obligated to subcontract with a designated leader for assistance. (The leader may be producing under another contract.)

Major Automated Information System (MAIS) Acquisition Program. See DoD 5000.2-R, "Part 1", p. 2-3.

Major Defense Acquisition Program (MDAP). An acquisition program that is not a highly sensitive classified program (as determined by the Secretary of Defense) and that is:

1. Designated by the Under Secretary of Defense (Acquisition and Technology) (USD(A&T)) as an MDAP, or
2. Estimated by the USD(A&T) to require an eventual total expenditure for research, development, test and evaluation of more than 355 million in fiscal year (FY) 1996 constant dollars or, for procurement, of more that 2.135 billion in FY 1996 constant dollars, or
3. So designated by the DoD Component Head (10 USC 2302(5)).

Milestone Decision Authority (MDA). The individual designated in accordance with criteria established by the USD(A&T), or the ASD(C3I) for AIS acquisition programs, to approve entry of an acquisition program into the next phase (DoD 5000.2-R).

Non-Developmental Item (NDI). See Section 3.3.2.1, DoD 5000.2-R.

Open System. A design concept that implements specifications maintained by an open, public-consensus process for interfaces, services, and support formats. The purpose of an open system is to enable properly engineered components to be utilized across a wide range of systems with minimal change, to inter-operate with other components on local and remote systems, and to interact with users in a manner that facilitates portability.

Parametric Cost Analysis. A cost estimating methodology using statistical relationships between historical costs and other program variables such as system physical or performance characteristics, contractor output measures, manpower-loading, etc. Also referred to as top-down approach.

Readiness. The state of preparedness of forces or weapon system, or systems, to meet a mission or to engage in combat. Readiness is based on adequate and trained personnel, material condition, supplies/reserves of the support system and ammunition, numbers of operational units available, etc.

Streamlining.

1. An acquisition strategy communicating what is required in functional terms at the onset of the Program Definition and Risk Reduction (PDRR) phase. It allows flexibility for application of contractor's expertise, judgment, and creativity in meeting requirements. Ensures only cost-effective requirements are included in solicitation and contracts.
2. Broadly used to denote efforts to shorten the acquisition process.

Supportability. The degree of ease to which system design characteristics and planned logistics resources, including the logistic support elements, allows for the meeting of system availability and wartime utilization requirements.

Sustainability. The staying power of forces, units, weapons systems, and equipment usually measured in number of day's capability to sustain combat.

Tailoring. The manner in which certain core issues (program definition, program structure, program design, program assessments, and periodic reporting) are addressed in a particular program. The Milestone Decision Authority (MDA) seeks to minimize the time it takes to satisfy an identified need, consistent with common sense, sound business management practice, applicable laws and regulations, and the time-sensitive nature of the requirement itself.

Teaming.

1. An agreement by two or more firms to form a partnership or joint venture to act as a potential prime contractor.
2. An agreement by a potential prime contractor to act as a subcontractor under a specified acquisition program.
3. An agreement for a joint proposal resulting from a normal prime contractor-subcontractor, licensee-licenser, or leader-follower company relationship.

APPENDIX B
EXAMPLES OF
ACQUISITION STRATEGY DOCUMENTATION

Appendix B consists of two documents reformatted from the orignals. They are intended for illustrative purposes only. Page location of a specific text and charts varies somewhat from the originals.

JOINT STRIKE FIGHTER
SINGLE ACQUISITION MANAGEMENT PLAN

Joint Strike Fighter Program Office
Crystal City, Arlington, Virginia, United States of America



Distribution Statement D: Distribution authorized to the Department of Defense and U.S. DoD Contractors only, Administrative/Operational Use, 8 Oct 96. Other requests shall be referred to the Joint Strike Fighter (JSF) Program Office.
Approved for release to Joint Strike Fighter (JSF) Program Full Collaborative Partners, reference p.16, this document.

JOINT STRIKE FIGHTER
SINGLE ACQUISITION MANAGEMENT PLAN

PREPARED BY: DATE:

CRAIG L. STEIDLE
Program Director & Program Executive Officer
JSF/PD
Tele: 703-602-7390, ext 6600

CONCUR: DATE: 10/11/96

PATRICK McLAUGHLIN
Program Contracting Officer
NAVAIR 2.2 5C
Tele: 703-602-7390, ext 6676

I concur with the SAMP and recommend USD(A&T) approval of the acquisition strategy, program plan and baseline for CDP.
DATE: 21 OCT 1996

ARTHUR L. MONEY
Assistant Secretary
(Acquisition)
SAF/AQ
Tele: 703-697-6361

CONCUR: DATE: NOV 05 1996

JOHN W. DOUGLASS
Asst Sec of the Navy for Research, Development, and Acquisition
ASN(RD&A)
Tele: 703-695-6315

I approve the approach to Test and Evaluation Master Plan Development.

DATE: 10/23

PHILIP E. COYLE
Director, Operational Test and Evaluation
OSD(DOT&E)
703-697-3655

I approve the acquisition strategy, program approach and baseline for the Concept Demonstration Program.

DATE: NOV 15 1996

PAUL G. KAMINSKI
Under Secretary of Defense
(Acquisition & Technology)
USD(A&T)
Tele: 703-697-7968

JOINT STRIKE FIGHTER
SINGLE ACQUISITION MANAGEMENT PLAN

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- 2.1.2 Concept Demonstration
- 2.1.3 Technology Maturation

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4. Acquisition Strategy

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Annex A: Acquisition Program Baseline
Annex B: 17 Jun 96 USD(A&T) Memo
Annex C: Joint Advanced Strike Technology Charter
Annex D: Deviations/Waivers Matrix

EXECUTIVE SUMMARY

This Single Acquisition Management Plan (SAMP) documents key elements of the Joint Strike Fighter (JSF) program approved through an extensive series of Defense Acquisition Board program reviews from Sep 95 to Feb 96. The Under Secretary of Defense for Acquisition and Technology, in the attached 17 Jun 96 memorandum, directed the submission of milestone documentation prior to the planned start in Nov 96 of the Program Definition and Risk Reduction (PD&RR) phase. This SAMP addresses Milestone I statutory requirements along with the Acquisition Strategy, Cost As an Independent Variable objectives, PD&RR Phase exit criteria, Test and Evaluation Master Plan philosophy, and an Acquisition Program Baseline. It further reflects documentation required by statute plus other information as "tailored in" by the Overarching Integrated Product Team to complete the requirements of a Milestone I review.

The JSF program will develop and deploy a family of strike aircraft by capitalizing on commonality and modularity to maximize affordability while addressing the needs of the Air Force, Navy, Marine Corps and our allies. The focus of the program is affordability—reducing the development, production, and ownership costs of the JSF family of aircraft.

Endorsement of this SAMP approves continuation of the Joint Strike Fighter program and entry into the PD&RR phase in the first quarter of FY97. Three integrated parallel PD&RR efforts—requirements definition, concept demonstration and technology maturation—will lead to a Milestone II decision in FY01 and entry into the Engineering and Manufacturing Development (E&MD) program.

The Services' requirements definition efforts are being facilitated by the JSF program office. This process is based on the principle of Cost As an Independent Variable; early interaction of the warfighter and developer ensures cost / performance trades are made early when they can most influence weapon system cost. The first formal document of this process was the Joint Initial Requirements Document (JIRD). This document reflects the JSF approach towards achieving affordability and replaces the need for a Mission Need Statement at this stage of the program. This document will be annually revised based on continuing refinement of requirements and culminate in a Joint Operational Requirements Document in FY99.

Concurrently, the JSF program will competitively downselect from three to two weapon system concepts prior to concept demonstration efforts within the PD&RR phase. The principle objective is to demonstrate, to a low level of technical risk, those critical technologies, processes and system characteristics necessary to produce an affordable family of strike aircraft that meets all participants' needs. Contractors will conduct specific demonstrations that are critical to reducing risk for their concept and will feature flying concept demonstrators, concept unique ground demonstrations, and continued refinement of their preferred weapon system concept.

Parallel technology maturation demonstrations are also an integral part of the PD&RR objective of meeting warfighting needs at an affordable cost. These efforts focus on seven critical areas: avionics; flight systems; manufacturing and producibility; propulsion; structures and materials; supportability; and weapons. The goal is to evolve the most promising leading edge technologies to a low level of risk prior to integration during the JSF E&MD program. Demonstration plans are coordinated with the prime weapon system contractors and results are made available to all program industry participants

This SAMP will be reviewed annually and updated as necessary as the program proceeds toward Milestone II. Completion of the next update to the JIRD, an interim System Threat Assessment Report, and an interim Test and Evaluation Master Plan are all expected by Summer 97; program information resulting from these documents and the start of the PD&RR phase will be included in the next SAMP update.

JOINT STRIKE FIGHTER
SINGLE ACQUISITION MANAGEMENT PLAN

1. BACKGROUND

The Secretary of Defense's 1993 Bottom Up Review (BUR) acknowledged the Services' need to replace aging strike assets in order to maintain the nation's combat edge. Consequently, the USD(A&T) memorandum of 11 Aug 93 formally requested a joint Air Force/Navy plan to implement the Joint Advanced Strike Technology (JAST) program as a comprehensive advanced technology effort to prepare the way for next generation strike weapon systems. On 1 Sep 93, the Secretary of Defense presented the BUR and formally announced his intent to cancel the Navy AFX and Air Force Multi-Role Fighter programs and create the JAST program. The initial Joint Service plan was approved on 12 Oct 93 by USD(A&T). On 14 Oct 93, USD(A&T) sent letters to the Chairmen and the Ranking Minority Members of the Defense Committees announcing his approval of the joint Service plan and soliciting their support. The Deputy Secretary of Defense endorsed the JAST program strategies on 9 Dec 93, and then on 27 Jan 94, USD(A&T) formally established the JAST program. The JROC endorsed the JAST process and acquisition approach in August of 95. In the Fall of 95, several Overarching IPT and DAB program reviews were conducted resulting in approved program plans for a Concept Demonstration Program and formal release of Requests for Proposal. The JAST program was renamed the Joint Strike Fighter and will ultimately lead to the development and deployment of weapon systems for the Services. The JSF was designated an ACAT ID Major Defense Acquisition Program by USD(A&T) in May 96.

The attached Charter for the JAST program, signed by the Deputy Secretary of Defense and Service Secretaries in Aug 94, is the foundation of the Joint Strike Fighter program. This Charter continues to be the cornerstone for the program and will be updated periodically to reflect significant changes. The jointly manned program has no lead service and is located in the Washington, DC vicinity. The JSF Program Director (PD) position will periodically alternate between the Departments of the Air Force and Navy and report to the opposing Department's Acquisition Executive. The JSF PD is also the Program Executive Officer (PEO). The Departments of the Air Force and Navy each provide approximately equal shares of annual funding for the program.

FY 95 legislation merged the Advanced Research Projects Agency (ARPA) Advanced Short Take-off and Vertical Landing (ASTOVL) program with the JAST program. DARPA is providing personnel and funding for JSF program execution but will phase out by 1999. As an extension to collaboration under the ASTOVL program, the United Kingdom Royal Navy is also participating in JSF in accordance with a 1995 Memorandum of Understanding.

The Services anticipate the JSF will meet their following stated needs:

- USN – first day of war, survivable strike fighter aircraft to complement F/A-18E/F
- USAF – multirole aircraft (primary-air-to-ground) to replace the F-16 and A-10

- USMC – STOVL aircraft to replace the AV-8B and F/A-18A/B/C/D

- Royal Navy – supersonic STOVL aircraft to replace the Sea Harrier

2. JOINT STRIKE FIGHTER PROGRAM CONTENT

The JSF program will develop and deploy a family of strike aircraft, capitalizing on commonality and modularity to maximize affordability while addressing unique Service needs. The focus of the program is affordability—reducing the development cost, production cost, and cost of ownership of the JSF family of aircraft. The program is accomplishing this by facilitating the Services' development of fully validated, affordable operational requirements, and lowering risk by investing in and demonstrating key leveraging technologies and operational concepts prior to the start of the JSF E&MD program.

An initial Concept Exploration Phase focused on innovative concepts and technologies to reduce cost for accomplishing joint strike warfare while maintaining U.S. combat capability. The current Concept Definition and Design Research (CDDR) phase focuses on (1) developing designs that take advantage of the "family of aircraft" concept and (2) defining the necessary leveraging technology demonstrations that will lower risk. CDDR will conclude in Nov 96 with the downselect from three weapon system concepts to two for 51 month concept demonstration efforts as part of the PD&RR phase. In parallel to the concept demonstrations, numerous Technology Maturation efforts in leveraging areas will continue to be pursued to reduce risk and lower the Life Cycle Cost (LCC) of the JSF. The program will then downselect to one weapon system concept prior to entering the JSF E&MD program in 2001 which will lead to delivery of operational aircraft beginning in 2008.

2.1 PROGRAM DEFINITION AND RISK REDUCTION

The JSF program is preparing to enter its PD&RR phase in the first quarter of FY97. Three integrated parallel PD&RR efforts—requirements definition, concept demonstration and technology maturation—will lead to a Milestone II decision in FY01 and entry into the E&MD program.

2.1.1 Requirements Definition

The JSF Program Office (JPO) is facilitating the Services' requirements definition efforts. Integrated product teams of warfighters and technologists use the disciplined Strategy-to-Task process supported by an extensive underpinning of Modeling, Simulation and Analysis (MS&A) to help the Services develop a set of requirements with maximum focus on jointness consistent with technology's ability to support them affordably. Industry is a full participant on these teams. This emphasis on early interaction of the warfighter and the developer ensures cost versus performance trades are made early when they can most influence weapon system cost.

The Strategy-to-Task-to-Technology process derives capability and technology needs from the National Security Policy. This approach, as depicted in Figure 1, ensures capabilities are consistent with the intended use of the end system while providing a prioritizing mechanism for technology

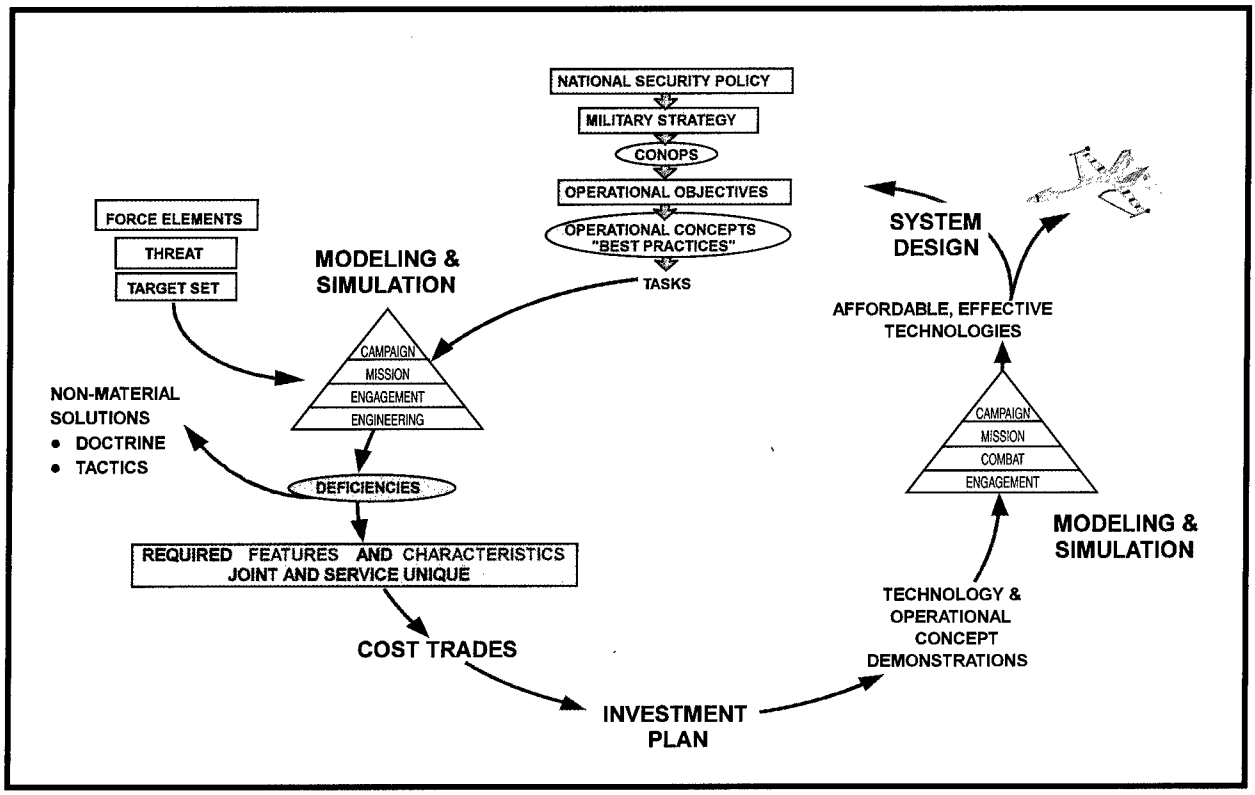


Figure B-1. Strategy to Task to Technology Process

assessment. Quality Function Deployment was used to link campaign warfighting objectives to operational tasks and potential deficiencies in a Major Regional Contingency (MRC). Assessments continue using MS&A to assist in the identification of deficiencies and assess potential solutions relative to JSF. Through the CAIV process, described in Section 4.3, options considered for JSF are related to cost to identify affordability trades relative to the technology or capability. The JPO thus has a means to identify enabling technologies to roll into the investment plan. In the meantime, such technology advances are once again run through MS&A to allow only the most affordable, capable technologies onto the Preferred Weapon System Concepts (PWSC). The program is uniquely designed to facilitate warfighter requirement trades through this iterative process, best capitalizing on technology opportunities and the ability to meet operational deficiencies at an affordable price.

The first formal product of the requirements definition process was the Joint Initial Requirements Document (JIRD). This original JIRD, or JIRD I, was signed by all of the participating Services and briefed to the Joint Requirements Oversight Council (JROC) in August 95. In order to reflect the JSF approach towards affordability, the JIRD replaces the need for a Mission Need Statement. The JROC endorsed the JAST process and the "family of aircraft" approach and emphasized "the great potential towards achieving an affordable solution to meet our joint warfighting capability." As part of this iterative requirements definition process, subsequent JIRD updates will be accomplished annually with focus on additional representative attributes outlined in Figure 2. This process will culminate into the Joint Operational Requirements Document (JORD) anticipated in FY1999.

JIRD I (1995)	JIRD Development → JORD (FY99)		
Affordability	Affordability		
RCS	Accuracy	IR Signature	RCS
IR SIG	Accurate NAV	Log "Footprint"	RCS V ECM
Speed	Adverse	Low Acoustic	RCS V Supportability
Maneuverability	Weather/Night	Signature	Reliability
Payload	Basing Flex./Carrier	Low Visual Sig	Route Planning
SGR	Suit	Maintainability	SGR
Log "Footprint"	BDA	Maneuverability	Shipboard Comp
Shipboard Comp	Commonality	Mission Flexibility	Situational
Commonality	Countermeasures	Mission Level	Awareness
Interoperability	Emissions Control	Intelligence	Speed
Range	Range	Mission Planning	System Redundancy
	Hardening	Multi-Role Capable	Target Acquisition
	Human Systems	Pass/Receive Timely	Weapons Carriage
	Integration	Info	Versatility
	Identify Target	Payload	Weapon/Sensor
	Interoperability	Range	Integration

Figure B-2. Representative JIRD Attributes

A Defense Intelligence Agency-validated JSF Interim System Threat Assessment Report (ISTAR) is anticipated to be published by Feb 97.

The JSF will be part of the future System of Systems that makes up the warfighting potential of the United States. As part of this System of Systems, and in order to maximize combat effectiveness, the JSF will be integrated with the Command, Control, Computers, and Communications (C4) systems and Intelligence, Surveillance, and Reconnaissance (ISR) systems. In keeping with DoD 5000.2-R, Mandatory Procedures for Major Defense Acquisition Programs and Major Automated Information System Acquisition Programs, a C4I Support Plan will be prepared during the PD&RR phase.

The C4I Support Plan will include: a system description, employment concept, intelligence infrastructure support requirements, interoperability and connectivity characteristics, management and scheduling concerns.

2.1.2. Concept Demonstration

The JSF program will competitively downselect from three to two weapon system concepts for concept demonstration efforts. It will feature flying concept demonstrators, concept unique ground demonstrations, and continued refinement of the contractors' PWSC.

Section 4.1 covers the acquisition details on the concept demonstration portion of PD&RR.

2.1.3 Technology Maturation

Technology maturation is another key aspect of the JSF approach to providing strike aircraft systems that meet warfighting needs at an affordable cost. The primary goal of the JSF technology maturation program is to evolve the most promising leading edge technologies to a low level of risk prior to integration during the JSF E&MD program. Demonstration plans are coordinated with the prime Weapon System Contractors (WSC) and results are made available to all program industry participants. Achieving affordability objectives for the prime contractors' PWSC depends on availability of these technologies for incorporation in E&MD, production and operation and support developments.

Technology maturation efforts focus on seven critical areas: avionics; flight systems; manufacturing and producibility; propulsion; structures and materials; supportability; and weapons. Figure 3 provides examples of technology maturation program which bring together the best of industry to develop an integrated product which meets both warfighting and affordability goals.

These on-going efforts are being accomplished in parallel with contractor refinement and demonstration of their JSF PWSC.

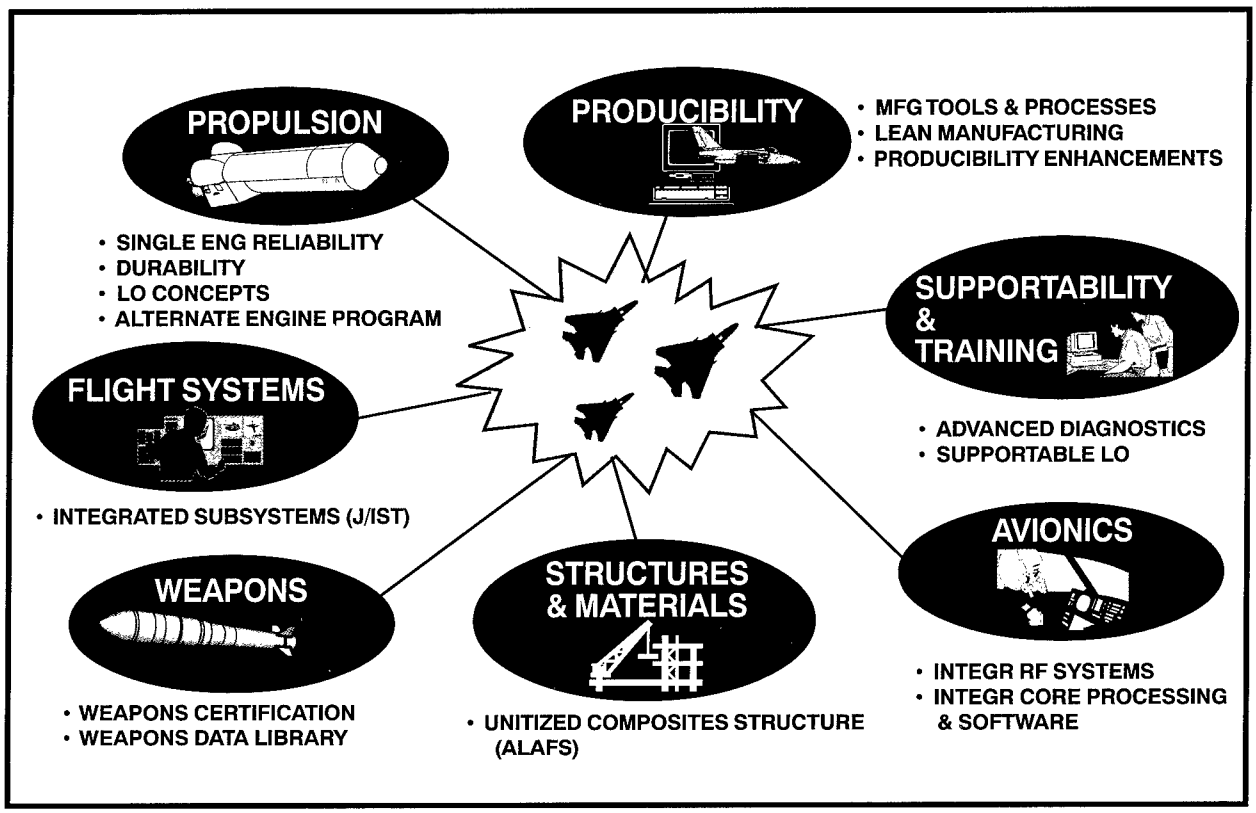


Figure B-3. Key Technology Maturation Programs

2.2 ACQUISITION STREAMLINING

The JSF program continues its role as a leader in the area of DoD acquisition streamlining and reform and use of "paperless" processes. It emphasizes electronic media as the standard means of communication and exploits the Internet for efficient, real-time dissemination of program information, including that related to procurement solicitations.

2.3 PROGRAM SCHEDULE

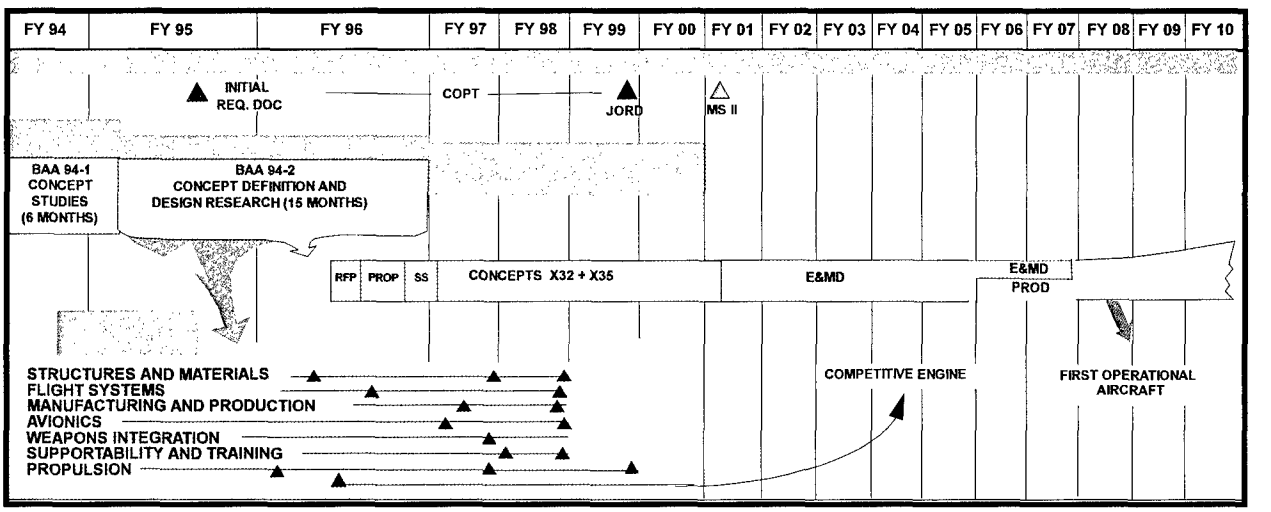


Figure B-4. JSF Program Schedule

3. FUNDING

The Departments of the Air Force and Navy provide equal shares of Research, Development, Test and Evaluation (RDT&E) funding. The Defense Advanced Research Projects Agency and the United Kingdom (UK) contribute funding as well. The FY 98/99 BES (Sep 1996) reflects the following funding profile ($-M-TY): (See next page)

The profile includes funding for alternate engine development activities prior to Milestone II. Funding for alternate engine development during E&MD will be addressed in future Service POMs.

	Prior	FY97	FY98	FY99	FY00	FY01	FY02	FY03	To Comp	TOTAL
Pre-E&MD										
0603800F	165.1	263.9	459.9	468.0	246.8	23.8	0.0	0.0	0.0	1,627.5
0603800N	208.9	246.8	452.2	471.1	251.7	25.6	0.0	0.0	0.0	1,656.3
0603800E	28.9	78.4	23.9	0.0	0.0	0.0	0.0	0.0	0.0	131.2
DoD Subtotal	402.9	589.1	936.0	939.1	498.5	49.4	0.0	0.0	0.0	3,415.0
UK	14.0	71.0	55.0	34.0	26.0	0.0	0.0	0.0	0.0	200.0
TOTAL	416.9	660.1	991.0	973.1	524.5	49.4	0	0	0	3,615.0
E&MD										
0604800F						564.0	1,410.0	1,927.0	6,063.0	9,964.0
0604800N						561.9	1,406.8	1,923.8	6,071.5	9,964.0
DoD Subtotal						1,125.9	2,816.8	3,850.8	12,134.5	19,928.0
Other anticipated (Foreign Participation) **						72.0	180.0	246.0	774.0	1,272.0
TOTAL Required						1,197.9	2,996.8	4,096.8	12,908.5	21,200.0

** "Other anticipated": Reflects anticipated foreign funding in accordance with DEPSECDEF memorandum dated 29 Apr 96.

4. ACQUISITION STRATEGY

4.1 CONCEPT DEMONSTRATION STRATEGY

In early FY97 the JSF program will competitively award two weapon system concept demonstration contracts. Each winning contractor team defines those demonstrations it believes are crucial to its concept for transition to E&MD. This strategy has several advantages:

(1) Maintains a competitive environment between contractors prior to E&MD.

(2) Provides two different STOVL approaches and aerodynamic configurations.

(3) Allows demonstration of the viability of an affordable, multi-service family of variants —high commonality and modularity between conventional take-off and landing (CTOL), aircraft carrier capable (CV), and STOVL variants.

(4) Provides affordable, lower risk transition to E&MD in FY 2001.

A contract will be awarded to Pratt and Whitney to provide hardware and engineering support for the Weapon System Concept Demonstration efforts. A contract will also be awarded to General

Electric for pre-E&MD technical efforts to develop an F120 derivative alternate engine for production.

Each contractor team will produce two demonstrator aircraft; one aircraft from each team will demonstrate the STOVL concept while the other will demonstrate CTOL and CV variants. Aircraft designations are—X-32A, B, and C and X-35A, B, and C, denoting two concepts with variants for the USAF, USMC and USN, respectively.

This phase of the JSF Program will provide the foundation for an E&MD phase to develop a single, affordable family of multi-service variants.

4.1.1 Objectives

The principal objective of the Concept Demonstration Program (CDP) is to demonstrate, to a low level of technical risk for entering E&MD, those critical technologies, processes, and system characteristics necessary to produce an affordable family of strike fighter aircraft that meets Air Force, Navy, Marine Corps, and Royal Navy needs. The Program Office and selected contractors will conduct specific demonstrations to support weapon system concept definition and validation of technology benefits. Some of these demonstrations will be through "generic" technical maturation contracts and some by the individual weapon system contractors as they require concept unique demonstrations. Additional objectives for the CDP include defining a Multi-Service Preferred Weapon System Concept (PWSC) to a level of technical detail that will enable transition to E&MD and developing and implementing streamlined management and control processes which use earned value as a tool to help lower cost for the Concept Demonstration and subsequent phases.

4.1.2 Demonstrations

Weapon system contractors will conduct specific demonstrations that are critical to reducing risk for their PWSC and identify the relationship to those technology maturation and operational concept demonstrations being performed within the JSF Concept Demonstration Program and/or other government sponsored programs. Demonstrations will take into account multi-service needs established in the Joint Initial Requirements Document (JIRD) and its subsequent publications. The contractors will use extensive modeling and simulation for demonstrating PWSC effectiveness in the government-supplied scenarios and missions using government-approved core constructive models, and the Virtual Strike Warfare Environment (VSWE). Analysis along the pillars of lethality, survivability and supportability will be conducted both to further the evolution of the JIRD as well as to provide adequate planning for E&MD and follow-on support.

The most visible element of the CDP will be two flight demonstrators representing the contractor's PWSC "family of aircraft." This segment will include only those technologies and concept attributes or factors which require flight testing or where flight testing is the most cost effective approach to achieving CDP objectives. The objective is to demonstrate key critical features of the contractor's PWSC which cannot be economically or practically substantiated by any other means. Two flying Concept Demonstrator Aircraft (CDA) are considered necessary to ensure successful completion of critical test objectives and provide risk mitigation. As a minimum, the following CDA test objectives will be demonstrated:

(1) Commonality/Modularity for an affordable family of multi-service variants.

(2) Successful short takeoff, vertical landing, hover and transition.

(3) Satisfactory low speed carrier approach flying and handling qualities.

Affordability analysis and demonstration will be another important element of the CDP. Contractors will demonstrate the systems, processes and cost models which are required to ensure that the E&MD program, production family of aircraft, and operations and support meet the JSF affordability targets specified in the JIRD. Industry and government will cooperatively refine the Joint Common Cost Model (JCCM) toward the objective of having a mutually agreed upon life cycle cost estimate to support Cost and Operational Performance Trades (COPT) and subsequent Analysis of Alternative (AOA) efforts leading to the Milestone II Acquisition Decision. These cost models and estimating methodologies must incorporate affordability benefits from innovative design and manufacturing approaches, tooling concepts, and acquisition process improvements to reduce initial product cost and long term life-cycle cost.

4.1.3 Weapon System Development and Systems Engineering

Another principal objective of the JSF Concept Demonstration Program is to define a Multi-Service Preferred Weapon System Concept (PWSC) to a level of technical detail that will enable transition into E&MD. Contractors will mature their PWSC through design refinement and systems engineering to integrate Government and WSC technology maturation and operational concept demonstration results. They will also support Government analysis of cost-performance trades during development of a Joint Operational Requirements Document (JORD). At the close of the CDP, contractors will deliver a Weapon System Development Plan (WSDP) for the E&MD Phase which documents the results of its weapon system development and systems engineering and integration efforts. The WSDP will include PWSC system description, operational concepts, risk management plans, air vehicle features and characteristics, weapon system functional allocations and technologies, Reliability and Maintainability (R&M) allocations, simulation (virtual) development plans, software development plans, initial manufacturing plans, support concept and training plans, and an E&MD transition and execution plan.

4.1.4 Contract Strategy

4.1.4.1 Background

Twelve contracts were awarded in the initial Concept Exploration Phase, focused on innovative concepts and technologies to reduce the cost of joint strike warfare in the future. Participating contractors included the following airframe contractors: McDonnell Douglas, Boeing, Lockheed, Northrop and Grumman. Study contracts were awarded to Georgia Tech and Johns Hopkins for analysis of "one versus two" engine issues. The JSF Program completed its Concept Exploration Phase in December 1994. The results of that phase underscored the possibility and benefit of commonality as an available means of achieving significant savings in next generation aircraft. The

key conclusion was that a family of aircraft can meet tri-service needs, with an overall significant Life Cycle Cost savings.

Weapon system Concept Development Phase efforts commenced in December 1994, focused on developing designs that take advantage of the "family of aircraft" concept and defining the necessary technology demonstration that will lower risk prior to entering E&MD of the JSF. Separate contracts were awarded to Boeing Defense and Space Group, Lockheed Fort Worth Division, McDonnell Douglas Aerospace, and Northrop Grumman Corporation for weapon system Concept Definition and Design Research (CDDR) efforts. Subsequently McDonnell Douglas, Northrop Grumman and British Aerospace executed a teaming agreement for execution of the ongoing CDDR contracts and to compete for future JSF contracts. During this phase engine trade studies were performed by GE, Pratt and Whitney, and Allison. Subsequently all three of the JSF Program weapon system prime contractors independently selected either the basic or a derivative of the Pratt and Whitney F119 as the cruise engine for their Preferred Weapon System Concepts and demonstrator aircraft. Numerous contracts were also awarded for risk-reducing technology demonstrations.

4.1.4.2 Concept Demonstration Program Contract Strategy

The weapon system Concept Demonstration Program will be a full and open competition with two weapon system prime contracts awarded. Contract type will be Cost Plus Fixed Fee (CPFF). The downselect for E&MD will be conducted as a full and open competition. The PD&RR contracts will include provisions for either an early downselect or a downselect at the end of contract performance. It is anticipated that the JAST/JSF CDP contractors will be the only responsible sources capable of competing for the E&MD Program. However, the E&MD synopsis and Call For Improvement (CFI) will permit proposals to be submitted by other than pre-EMD contractors and the Government will evaluate all offerors' proposals. Criteria for downselect will be defined during the CDP, prior to CTOL first flight.

A sole source, Cost Plus Award Fee contract will be awarded to Pratt & Whitney to provide hardware and engineering support for the Weapon System Concept Demonstration efforts. A Propulsion Systems Integration Board shall be established, and its membership will include representatives of the Government, in accordance with contract requirements, weapon system prime contractors, engine contractor, and other associate contractors. The weapon system prime contractors will have Total System Performance Responsibility for the CDA engine functioning integrally within the CDA and the PWSC engine functioning integrally within the PWSC. Associate contractors will participate in formal meetings between the weapon system prime contractors, the engine associate contractor, and the Government to review integration status of the CDA and PWSC on a monthly basis. In an effort to realize potential production cost savings, a sole source, CPFF contract will also be awarded to General Electric for pre-E&MD technical efforts to develop an F120 derivative alternate engine for production.

4.1.5 Foreign Participation in Joint Strike Fighter

The JSF is a cooperative program for the PD&RR phase. A framework has been established to accommodate foreign participants. There are four levels of involvement:

1. Full Collaborative Partner	Negotiated Contribution Right to Influence Requirements
2. Associate Partner	Negotiated Contribution Limited Influence on Requirements
3. Informed Customer	Negotiated Contribution Access to Program Information
4. Contractual Relationships between foreign companies and U.S. Primes	

Currently, the United Kingdom is on board as a full collaborative partner through an MOU signed in December, 1995. The Netherlands, Denmark and Norway have issued letters of intent to become Associate/Informed Partners. Memorandums of Understanding will be negotiated for participating countries.

4.2 ENGINEERING AND MANUFACTURING DEVELOPMENT PLANNING

The JSF E&MD schedule depicted at Figure 5 will be used for planning purposes by the Weapon System Contractors during PD&RR.

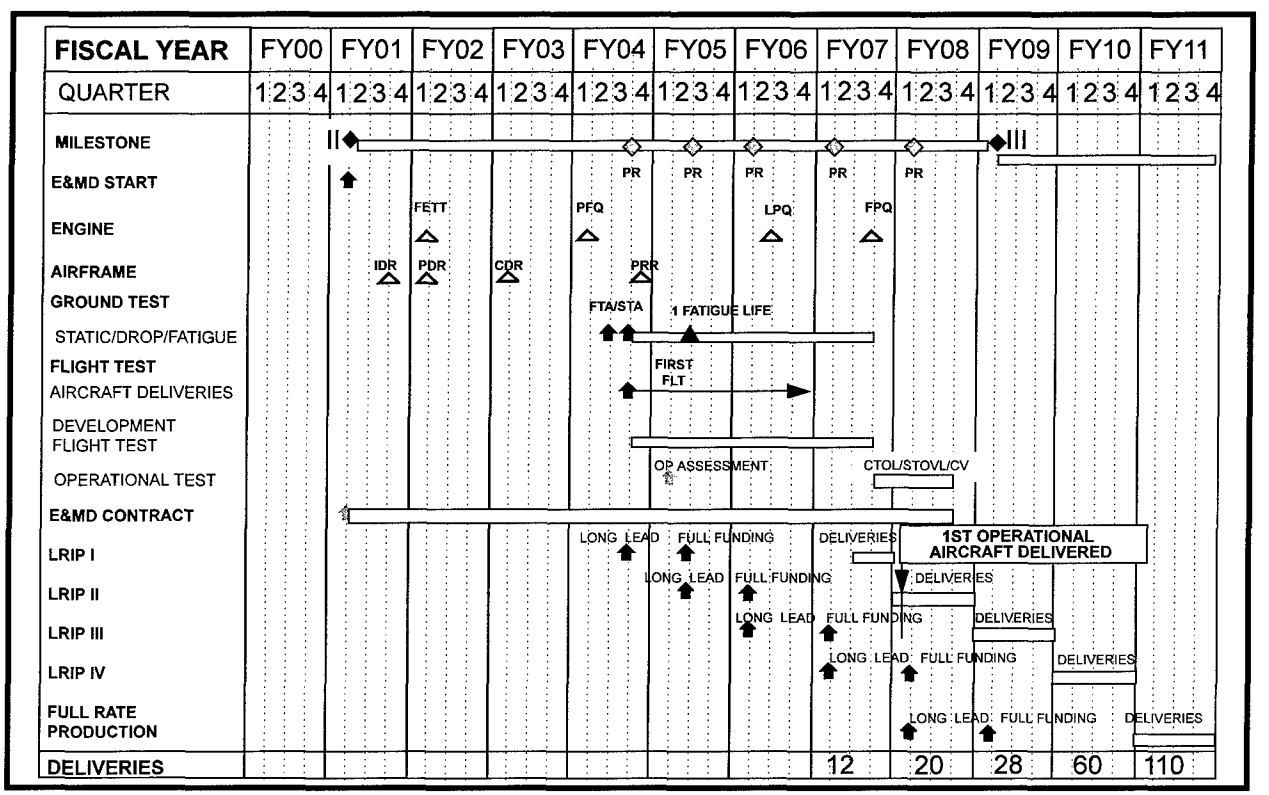


Figure B-5. E&MD Schedule – For Planning Purposes Only

4.3 COST AS AN INDEPENDENT VARIABLE (CAIV)

The USD(A&T) identified the JSF program as one of the flagship programs for implementation of CAIV. JSF is a leader in implementing cost containment initiatives while ensuring warfighting capabilities are not compromised. Tasks associated with the flagship designation include cataloguing lessons learned and building applications for the program to employ the covenants of CAIV. Unique to this flagship is that requirements are shaped / refined through CAIV before a final JORD is validated.

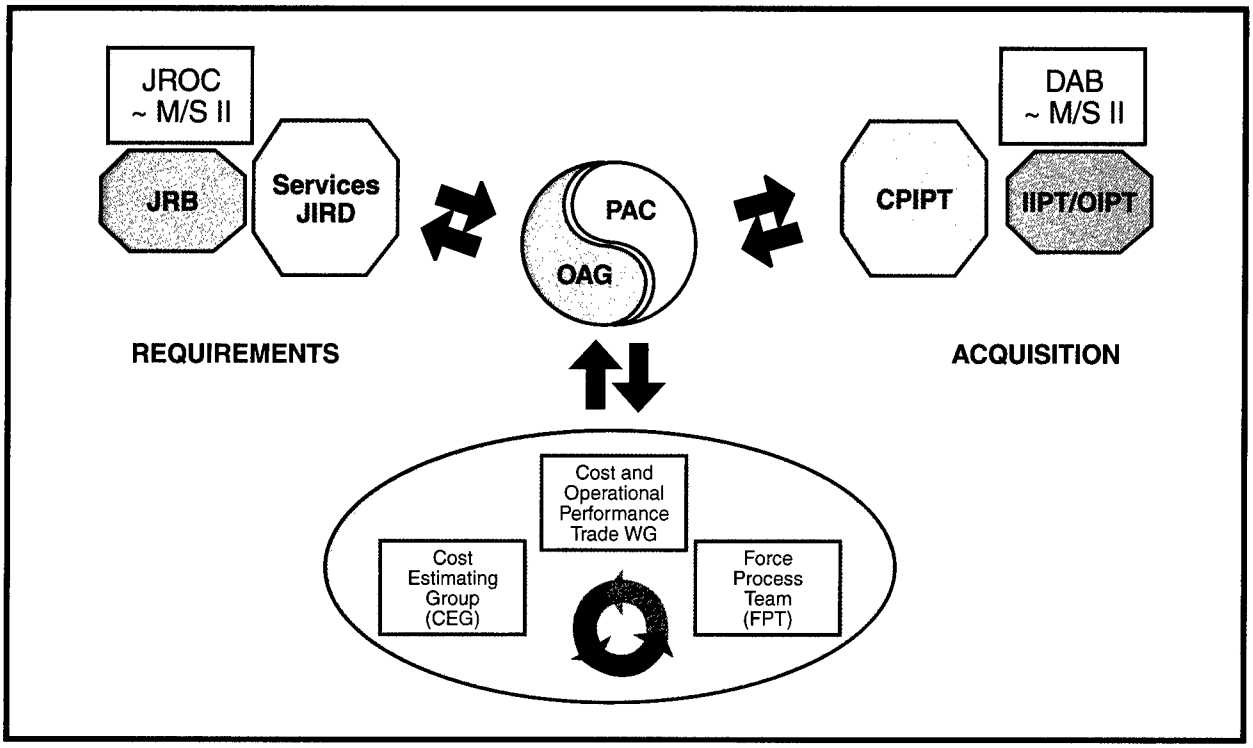


Figure B-6. Joint Strike Fighter CAIV Process

4.3.1 CAIV Process and Organizations

An essential element of the CAIV process is the requirement for warfighter/technology cost trade studies. The major elements of the cost performance trade process include requirements development and implementation, and oversight. Figure 6 graphically presents the JSF approach. Working Level IPTs will conduct and exercise Cost and Operational Performance Trades (COPT) providing results and recommendations to the operators (Operational Advisory Group) and the Program Office (Program Affordability Council). The OAG uses the trades to draft the JIRD, and eventually the JORD. The draft JIRD along with COPT information is then used by the Services to staff and finalize the document through the established requirements process ultimately resulting in JROC validation of the JORD. During the requirements (i.e. JIRD/JORD) validation process, any new requirements will be considered in the context of affordability with cost / performance trades provided by the OAG/PAC.

The PAC uses the COPT information and user requirements to build and recommend program strategies, reform measures, CAIV targets, and acquisition plans to the Program Director. Out of the PAC, cost / performance trades are reviewed by the Cost / Performance Integrated Product Team (CPIPT). The CPIPT will evaluate all cost performance trade-off analyses conducted and make recommendations to the Program Director on resulting acquisition issues or desirable further trades. Any acquisition issues or lessons learned from this process will be carried to the OIPT and the DAB as appropriate. This process ensures a program balance between affordability and the Service users' needs of Lethality, Survivability, and Supportability. The relationships of these groups are outlined below:

- Operational Advisory Group (OAG)
  - Function: Develop weapon system requirements and draft JIRD/JORD for Service coordination and approval using COPT.
  - Membership: Service users
  - Chair: JSF/RQ facilitates OAG

- Program Affordability Council (PAC)
  - Function: Develops acquisition strategy and program plans to meet the Service users' needs as specified in the JIRD/JORD. Recommends program approach to the Program Director. Advises the Program Director on all issues relative to program planning and execution.
  - Membership: JSF Program Technical Director, Systems Engineering Director, Requirements Director, Contracting Officer, and the Concept Demonstration Program Managers.
  - Chair: Program Technical Director.

- Cost / Performance Integrated Product Team (CPIPT)
  - Function: Evaluate all cost / performance trade-off (COPT) analyses conducted and make recommendations to the Program Director on resulting acquisition issues or desirable further trades.
  - Membership: Program office, Service users, PA&E, J-8, DOT&E, DTSE&E, SAE, as a minimum, and other appropriate representation of the OIPT.
  - Chair: Program Director designee.

Three Working Level IPTs conduct the cost and operational performance trades with Industry support. These teams include representation from Service user and cognizant cost estimating communities outside the Program Office. At this level [Cost team, FPT, and COPT working group] Service users and cost estimators will have clear insight to design trade space, modeling tools and techniques, primary assumptions, and recommend trades of cost and performance.

The Working Level IPTs are:

- Cost Estimating Group (CEG)
  - Function: Develop the program average recurring unit cost, E&MD cost, and life cycle cost targets and to assess reasonableness of cost in the cost/performance trade process.

- Membership: JPO, Service, and OSD cost analysts.

- Cost & Operational Performance Trades (COPT) Working Group
  - Function: Integrate COPT results and produce COPT report that will be provided to the OAG and PAC. Recommend appropriate CAIV cost targets and further tradeoff studies to the OAG and PM through the PAC.
  - Membership: JPO, J-8, and OSD PA&E.

- Force Process Team (FPT)
  - Function: Exercise weapon system attributes through MS&A and support JIRD/JORD development.
  - Membership: JPO and Service users.

The JIRD / JORD development remains a Service user responsibility, facilitated by a requirements directorate within the Program Office. As a Flagship Program, the OSD sponsored CAIV Workshop will continue to have insight into the JSF CAIV process as will the three WIPTs.

4.3.2 Products of CAIV Process

The mechanism for implementing the cost/performance trades will be a "continuous COEA process." The JSF program refers to this process as Cost & Operational Performance Trades (COPT) which culminate in a final COPT report. The COPT will be coordinated with the JIRD/JORD development. This link promotes iterative and interactive requirements and cost target development, culminating in an Analysis of Alternatives (AOA) and a JSF system specification. The Analysis of Alternatives will be conducted by a joint, independent activity determined by the accountable DoD Component during the Concept Demonstration Program. Affordable cost targets will encompass process improvements and technical maturation initiatives. The COPT process participants will be empowered to conduct the cost and performance trades in association with the CDP program teams. It will be through these cost/performance trades that affordable JSF requirements are established and Preferred Weapon System Concepts evolve.

4.3.3 User/Industry Involvement

Service users are key participants in the CAIV process. Through the Force Process Team (FPT) and Operational Advisory Group (OAG), Service users are integrated into the working level trades. Membership on the CPIPT assures user trades are appropriately considered when assessing impacts on acquisition strategy.

Industry participants are being integrated into the COPT through the Concept Demonstration Program Managers and Systems Engineering Directorate and will be pivotal in addressing the design and engineering aspects of the cost/performance trades. They will identify and establish Technical Performance Measures (TPMs), Program Performance Measures (PPMs) and associated cost targets. The cost targets will be linked to the TPMs / PPMs and capture impacts of process improvements and technical maturation efforts.

4.3.4 Affordability Assessments

Affordability will continue to be a central theme for the JSF program. Life Cycle Cost (LCC) savings opportunities were identified early in the JAST/JSF program through the Technology Maturation process. Employing a Quality Function Deployment methodology, technologies were prioritized based on their contribution to LCC savings and warfighting benefits. Cost and performance were equally weighted. Technology Maturation focus and direction will continue to be assessed annually, as a minimum, to ensure alignment with program objectives. Cost targets will be established for Average Unit Recurring Flyaway Cost, E&MD cost, and Life Cycle Cost. These will serve as baseline independent variables for requirement and technology affordability trades. Cost targets for Average Recurring Unit Flyaway Costs are currently reflected in the JIRD:

(FY$94)	
USN	$31-$38 M
USAF	$28 M
USMC	$30-$35 M

5. PHASE I EXIT CRITERIA

Criteria for successful completion of the Concept Demonstration Program are:

a) Demonstrate that innovative commonality and modularity approaches will reduce cost relative to conventional production concepts.

b) Demonstrate successful short takeoff, vertical landing, hover and transition capabilities.

c) Demonstrate satisfactory low speed carrier approach flying and handling qualities.

d) Demonstrate to a low level of technical risk for entering E&MD, those critical enabling:
   - Technologies
   - Processes
   - System Characteristics

e) Define a Preferred Weapon System Concept (PWSC) adequate for E&MD transition.

All flight and ground technical demonstrations, with extensive use of modeling, analysis and simulation will be used to adequately measure achievement of the above criteria. These will provide confidence that user requirements specified in the JORD will be achievable through the E&MD Phase.

6. TEST AND EVALUATION PHILOSOPHY

6.1 COMBINED TEST WORKING GROUP INTEGRATED PRODUCT TEAM

The Combined Test Working Group (CTWG) is a working level IPT that integrates development and operational test activities of the JSF. The CTWG is charged with preparation and coordination of the Test and Evaluation Master Plan (TEMP) prior to Milestone II. Members of the CTWG include representatives from DOT&E, DTSE&E, Service SAE, user communities, the program office, and industry.

Given the evolving nature of the Joint Initial Requirements Document (JIRD) and the roadmap to the Joint Operational Requirements Document (JORD), the Combined Test Working Group will prepare a series of Interim-TEMP documents (I-TEMP). The first I-TEMP will be prepared by the CTWG to support CDP and released for signature six months after JIRD II is signed. This pattern will follow each JIRD release. When the JORD is released, the final TEMP will be prepared and signed to support the Milestone II decision and entry into E&MD.

6.2 DEVELOPMENTAL TEST AND EVALUATION

The JSF program will utilize the DoD recognized test process to verify that design risks have been minimized, substantiate achievement of contract technical performance requirements, and certify dedicated operational test readiness. Pilots from 3 services (USN, USMC, USAF) and the U.K. will participate in the flying demonstrations. The JSF program will use the Combined Test Force (CTF) concept, integrating both DT&E and Operational Test and Evaluation (OT&E) together at the primary test sites to avoid duplication of effort and allow early operational insight into the test program. All ground and flight test results will provide data to refine and validate modeling and simulation tools that are used for mission effectiveness evaluation.

6.3 OPERATIONAL TEST AND EVALUATION

During the Concept Demonstration Program, Operational Test Agencies (OTAs) will conduct an Early Operational Assessment (EOA) to assess the capability of the two proposed Preferred Weapon System Concepts (PWSC) to meet the requirements in the JORD. A Virtual Strike Warfare Environment (VSWE) will provide a baseline common environment to ensure consistent models and databases among participating test organizations. Since VSWE provides a common footing for requirements development and mission level measures of effectiveness (MOEs), its use will directly link the test and requirements processes.

6.4 LIVE FIRE TEST AND EVALUATION

During the Concept Demonstration Program, LFT&E will be accomplished on components and subassemblies based on analyses of vulnerable regions, areas of uncertainty, and prudent risk reduction for new construction techniques. The results of LFT&E will be used to update computer models and improve test data correlation. In a parallel activity, a cost-benefit analysis will be performed to weigh the benefits of performing full-up LFT&E testing during E&MD. If the analysis shows full-up testing to be prohibitively costly, then a waiver will be pursued prior to the Milestone II decision.

7. PROGRAM REVIEW AND INSIGHT

In a continuing effort to capitalize on streamlined approaches to acquisition management while concentrating on "insight" not "oversight" of the Joint Strike Fighter Program, it is the program's intent to share information on a routine basis using the Working Level and Overarching IPT process. Through this IPT approach, key staff functions and senior leaders will be able to provide early input to program strategies and plans, help resolve issues in a timely manner, and maintain continual insight to the program and contractors' progress toward critical performance goals. Therein, formal program decision documentation will include statutory information, mandatory regulatory information (unless waived) and only that additional information required to support the MDA's decision.

The IPT structure used throughout JSF involves process and product "stakeholders" from user, program office, field, headquarters, Secretariats and OSD offices. Figure 7 highlights the team structure to be used in the Concept Demonstration Program. The left of the figure displays the Program Office structure. The CDP Management Teams will execute the Concept Demonstration Programs with their contractor team to ensure adequate progress toward program objectives. Systems Engineering Integrated Product Teams will focus in particular disciplines of Air Vehicle, Mission Systems, Integrated Flight and Propulsion Controls, etc. To cover the "seams," Concept Action Teams are formed, comprised of cognizant offices across functional lines of the program office to ensure orchestrated and consistent activities are occurring within the pillars of Affordability, Lethality, Survivability, and Supportability. The pillar teams will report inconsistencies and make recommendations to the Program Affordability Council (PAC). The PAC serves as the senior advisory body to the Program Executive Officer on all program issues.

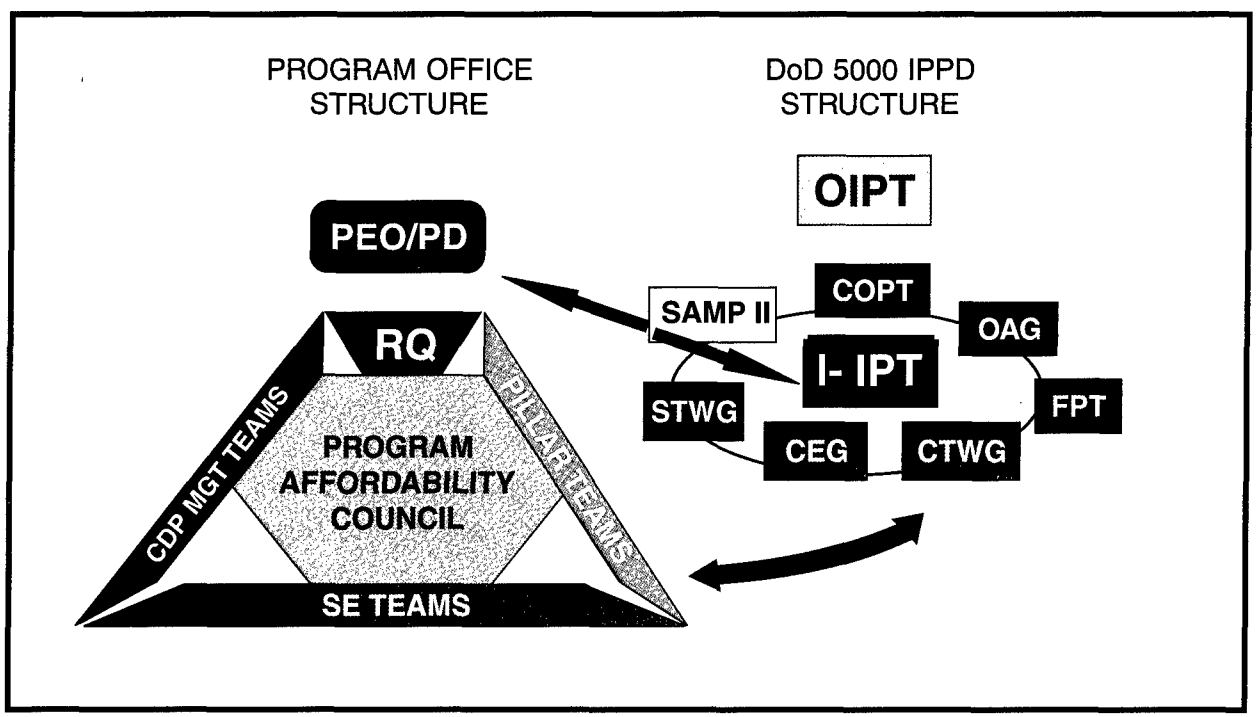


Figure B-7. JSF Integrated Product & Process Development

The right side of Figure 7 represents the "DoD 5000 Integrated Product and Process Development" model. The Joint Strike Fighter Program has been working in IPT fashion through the Operational Advisory Group (OAG), Force Process Team (FPT), Cost Estimating Group (CEG), System Threat Working Group (STWG), and Combined Test Working Group (CTWG) although, these may be known by other names from the current phase. Each of these teams involve representatives from appropriate IIPT, OIPT and user / requirement offices. The Cost and Operational Performance Trade Working was introduced in the CAIV process. The Combined Test Working Group is discussed in the test section. The Cost Estimating Group, previously known as the Affordability IPT, represents a team of estimators from across the Services, PA&E and the program office who convene to prepare and coordinate on formal cost estimating activities on the program. The System Threat Working Group is a working IPT with representation from across the U. S. Intelligence Community to define, analyze and document the operational threats anticipated for the Joint Strike Fighter. Finally, after CDP contract award, a SAMP IPT will stand up to work towards a tailored, Single Acquisition Management Plan for review and update as necessary, in preparation for Milestone II.

Up front integration of activities is intended to ensure that everyone has insight to the product and processes of JSF. This Integrated Product and Process Development Team approach will continue throughout the life of JSF. In this light, formal periodic documentation in the next phase will be limited to an RDT&E Selected Acquisition Report and a quarterly Defense Acquisition Executive Summary (DAES) report. The Program Office will propose a tailored DAES format for I-IPT consideration and Milestone Decision Authority approval.

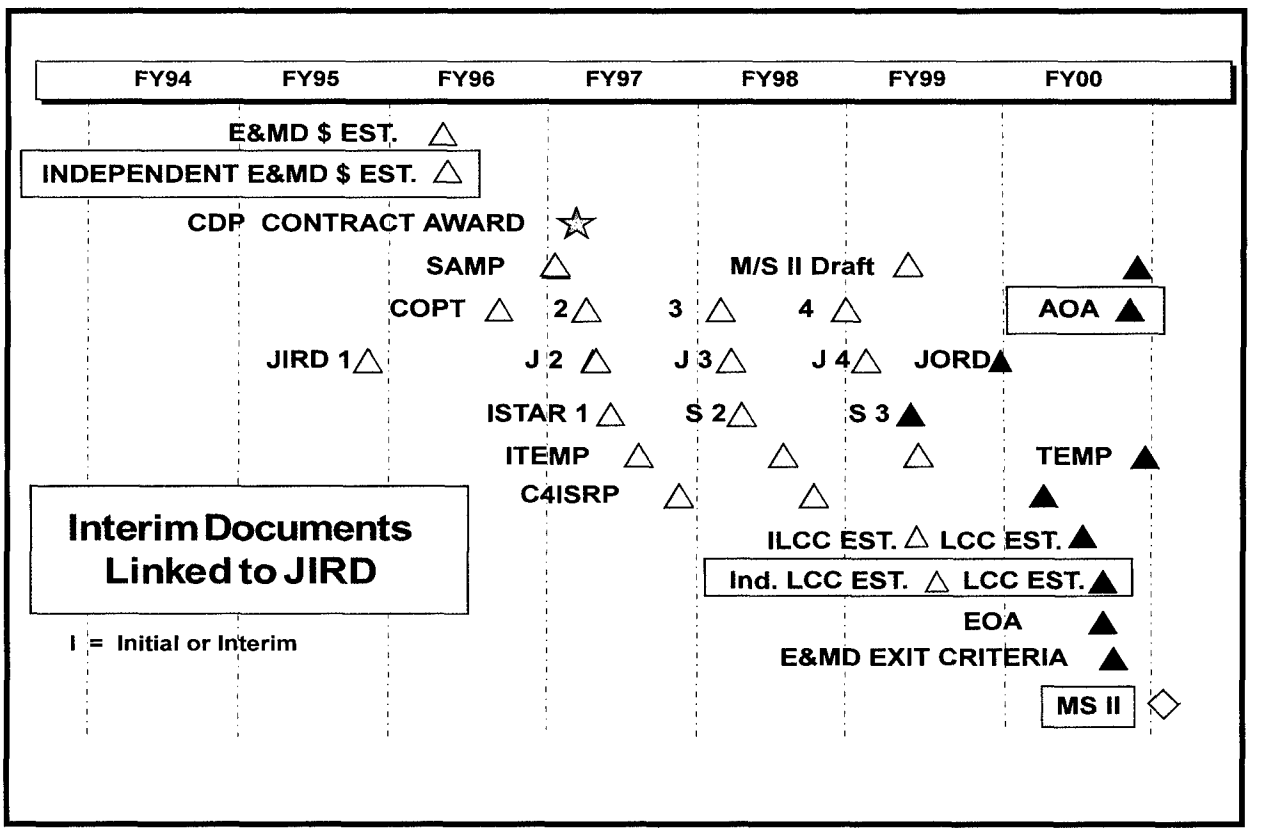


Figure B-8. Documentation Plan

Waivers and deviations per DoD 5000 normally required for a Milestone I decision are outlined in the attached matrix. Documentation, including appropriate regulatory and statutory waivers, for a Milestone II decision will be identified and consolidated into an updated Single Acquisition Management Plan, tailored-in, in accordance with DoD 5000.2R. Figure 8 reflects a planned schedule for program documentation requirements.

ACQUISITION STRATEGY
JOINT STARS COMMON GROUND STATION (CGS)

16 Jun 1999

1. ACQUISITION APPROACH

1.1 PROGRAM STRUCTURE/APPROACH

(Program Summary Diagrams provided as Appendix A).

1.1.1 Background

1.1.1.1 The Joint Surveillance Target Attack Radar System (Joint STARS)

Joint STARS is a multi-service, multi-mode radar system. The program objective is to provide the capability to locate, track and classify wheeled and track vehicles beyond ground line of sight, during the day and night, under most weather conditions. It provides Army Corps, Division and Brigade commanders with an "electronic high-ground" from which to observe enemy forces across the Forward Line of Own Troops (FLOT), in an enemy's first and second echelons. The Joint STARS (JSTARS) radar is mounted on an USAF E-8 aircraft, a Boeing 707 variant. It provides real time Moving Target Indicator (MTI) and Fixed Target Indicator/Synthetic Aperture Radar (FTI/SAR) information simultaneously to operators located in the aircraft and operators located in Army's Common Ground Station (CGS). Communications between the aircraft and CGS are via a secure digital Surveillance and Control Data Link (SCDL). The E-8 is but one sensor feeding tactical intelligence and targeting data to the CGS. The CGSs have the ability to supplement this radar data with Unmanned Aerial Vehicle (UAV) imagery, Electronic Intelligence (ELINT) reports received over the Commanders Tactical Terminal (CTT), Joint Tactical Terminal (JTT), imagery from National assets and other Imagery Product Libraries via Second Imagery Dissemination (SIDS), and various additional Army and other components platforms (i.e., U2, ARL, etc).

1.1.1.2 Executive and Participating Services

The Joint STARS program designates the Air Force as the Executive Service and the Army as the participating service. The Air Force is responsible for development, test, production and fielding of Air Force Prime Mission Equipment (PME); the airborne platform; the airborne Operations and Control (O&C) Center; and the airborne radar. The Army is responsible for the development, test, production and fielding of items of interest to the Army, specifically the CGS. The airborne segment of the SCDL, the Air Data Terminal (ADT) is also managed by the US Air Force. The CGS and Ground Data Terminal (GDT) are managed by the US Army under PE 64770A and BA1080.

1.1.1.3 Integrated Product Team

A joint Army/OSD Integrated Product Team (IPT) was established in June 1995 to develop an accelerated CGS program strategy and to obtain approval of the Acquisition Strategy Report (ASR)

and Acquisition Program Baseline. The IPT recommended and approved several changes to the Acquisition Strategy. Specifically, the FY96 and FY97 CGS quantities were designated as Low Rate Initial Production (LRIP) units. Designation of FY97 as a second year LRIP was determined to be necessary in order to maintain the production base until Operational Test is successfully completed and a Beyond LRIP decision is obtained. In December 1998, the DAE approved an additional LRIP of 12 units to maintain the production base while the program addressed concerns identified during IOT&E.

1.1.1.4 Acquisition Streamlining and Tailored Features

The CGS acquisition was significantly compressed by the elimination of a separate Engineering and Manufacturing Development (EMD) phase. The strategy was developed at the direction of the USD(A) during the FY93 DAB, and is in full compliance with the Army's and OSD's streamlining "Blueprint for Change." In lieu of an all encompassing EMD program, the expansion of GSM capabilities necessary to achieve full CGS requirements will be effected through a list of Pre-planned Product Improvements (P3I) to be designed, tested and integrated into the ongoing production line. The CGS contract was awarded in FY96 as an eight-year contract for the total CGS requirements. Initial LRIP units were authorized with the Milestone III Full Production Decision scheduled for FY99.

1.1.1.5 Milestone III Decision

The MSIII DAB is scheduled for July 1999. At the FY99 DAB, the Army will request the following decisions:

a. Full Scale Production (MSIII) of the CGS baseline (those capabilities/functionalities delivered in the FY96 CGS LRIP units and tested in the FY98 Operational Test). (This includes initial contract specifications and Group 0 P3I/ECP modifications to the basic contract.)

b. Approve the Acquisition Strategy (including the acquisition of 28 additional CGSs).

c. Approve the Acquisition Program Baseline (APB).

d. Classify the Army's multi-sensor pre-processor CGS as ACAT II Program.

A summary of CGS milestones leading to the FY99 DAB is provided as Appendix B.

1.1.2 Joint STARS Ground Station Requirements

The current JSTARS ORD identifies all mobile Ground Station requirements as CGS. Previous references to other Ground Station Module (GSM) variants are no longer relevant as these earlier variants are either decommissioned or in process of conversion to the CGS configuration. The last non CGS configured models will be decommissioned by December 1999. Final production quantities by year are summarized in Table 1. The quantities identified are based upon required fielding dates

Table B-1. Annual Army CGS Production Quantities*

FY	QTY
1995	8
1996	16
1997	16
1998	20
1999	14
2000	14
2001	12
TOTAL	**100**

* In FY97, 2 additional units were purchased for the USMC. The FY98 CGS Quantity includes four new CGS systems as well as upgrade/replacement of 16 MGSMs to CGS configuration. Various Government Furnished Equipment (GFE) and other standard Army items will be removed from the GSM variants and integrated with new prime mission equipment into the HMMWV configured CGS.

as contained in the current HQDA approved CGS Distribution Plan (Jan 98). Delivery and fielding of production units is shown in Appendix C.

1.1.3 Ground Station Configuration Descriptions

All Joint STARS Ground Stations consist of two vehicles, each with a trailer in tow. The vehicles are identified as prime and support. In order to satisfy rapid deployment/contingency requirements, the Joint STARS mission can be performed by the prime vehicle independently. A brief description of prior GSM variants is provided below.

1.1.3.1 IGSM

Shortly after the OSD creation of the Joint STARS program, the Army awarded its initial Ground Station development contract. This first, or Interim Ground Station Module (IGSM) established much of the hardware mechanical design, interoperability requirements and conops for future GSMs to build upon. The IGSMs received and processed radar data from the JSTARS aircraft or the MOHAWK (OV1D) Side Looking Airborne Radar (SLAR) (AN/UPD-7) systems, however, data processing was limited to sequential, (one at a time) processing. A total of 8 IGSMs were developed during EMD, deployed during Operation Desert Storm and fielded as part of the Joint STARS Contingency Corps. All IGSM were decommissioned by FY96.

1.1.3.2 MGSM

The Medium GSM (MGSM) provided enhancements to the IGSM capability. The MGSM enhancements include a downsized electronic suite, a significantly enhanced Man-Machine Interface

(MMI) with extensive Built In Test/Built In Test Equipment (BIT/BITE) capabilities, and the ability to simultaneously display and analyze data from multiple sensors. These sensors include the Joint STARS E8 Aircraft and the Unmanned Aerial Vehicles (UAVs). A Commanders Tactical Terminal - Hybrid Receive only (CTT-H/R) was integrated into the MGSM to provide near real-time signal intelligence reports to the GSM operator to support the identification of high-payoff targets. These enhancements were facilitated through the use of an open systems architecture and commercial standards (VME, 6U). All MGSMs will be decommissioned by December 1999.

1.1.3.3 LGSM

The Light Ground Station Module (LGSM) took the MGSM Prime Mission Equipment and integrated it onto a smaller, rapidly deployable HMMWV configuration. The LGSM program also added additional capability, the most specifically being "On the Move" operations. An LRIP contract for eight LGSMs was awarded in FY95, however prior to delivery of any units, the contract was modified to deliver the same hardware and software as the subsequent CGS. This modification was incorporated to eliminate the separate LGSM logistic tail and reduce O&S costs. Since all systems delivered off this contract are identical to the baseline CGS configuration, they are tracked and identified as CGSs. There are three EMD LGSMs remaining in the field. These assets will be decommissioned by December 1999.

1.1.3.4 Common Ground Station (CGS)

The requirement for the baseline CGS was that it provide the same capability as the LGSM, with the addition of Secondary Imagery Dissemination (SID). A number of Pre Planned Product Improvements (P3Is) are to be integrated into the CGS over the course of the Production Program. These P3Is include integration of additional sensor data, enhanced operational performance required by the user community and documented in the CGS Operational Requirements Document (ORD), and technology insertion initiatives. Still other P3Is are aimed at reducing life cycle O&S costs. P3I modifications will be designed, tested and integrated into the CGS baseline in several "groups". There is no particular significance to the grouping of specific P3I efforts, other than relatively similar priority. The specific P3I groups include:

GROUP	NRE START IN	PROD CUT IN	FIELDED	TEST	FY
Group 0 (Pre IOT&E)	FY96	FY96	FY98	IOT&E	(98)
Group 1	FY98	FY98	FY00	LUT 1	(01)
Group 2	FY99	FY98	FY00	LUT 1	(01)
Group 3	FY00	FY00	FY02	LUT 2	TBD
Tactical Common Data Link (TCDL)	FY00	*	FY05	LUT 2	TBD
Radar Technology Insertion Program	FY00	*	FY08	MOT&E	TBD

*Post Fielding Retrofit

The P3I plan is discussed below.

1.2 PRE PLANNED PRODUCT IMPROVEMENTS (P3I) PLAN

The CGS P3I modifications will be driven by the ORD, changes required to maintain interoperability with the Joint STARS aircraft and other systems, (e.g. UAVs, U2, ACS, etc.) changes driven by obsolescence or technology insertion, Army mandates (Defense Information Infrastructure/Common Operating Environment (DII/COE), Demand Assigned Multiple Access (DAMA) compliance, etc.). The P3I plan is to implement functionality upgrades into the production line/configuration in groups. Some of the planned P3Is will only require software modification. Other P3I initiatives will require changes/additions to the CGS hardware environment. The P3I modifications will be integrated into test prototypes and will be cut into the full production line following successful risk reduction assessment. P3I modifications that significantly modify the hardware suite (e.g. Group 1) and provide new or significantly modified functionality will receive a new Material Release (MR) prior to initial fielding. All technical and operational test, as well as system demonstrations and exercises will be considered in support of the MR decision. CGSs in the field will also be upgraded via field retrofit, as part of the Contractor Logistics Support effort. This will maintain a single O&S/logistical tail. The various P3I efforts funded in the current Future Years Defense Plan (FYDP) are detailed in the following paragraphs and Appendices D – F. Appendix D provides a detailed list of the various P3I efforts by their planned group. Appendix E displays the various efforts by year. Appendix F shows the projected annual costs associated with each effort.

1.2.1 Group 0 – Pre IOT&E Modifications

A number of modifications to the CGS Contract Baseline Configuration were initiated and integrated into the CGS Baseline prior to IOT&E. The most significant of these was the direct interface of sensor data between the Apache Longbow and CGS via the Improved Data Modem (IDM). Other Pre IOT&E modifications included an additional All Source Analysis System (ASAS) interface capability via Ethernet, an upgrade to the Remote Workstation Hardware (monitor) as well as software modifications to assist user performance and ease operations. The software enhancements to the man-machine interface included enhanced SIGINT Correlation, enhanced computer aided target tracking, improved data archiving/retrieval and improved embedded training scenarios. These software modifications did not add new capability but simplified/enhanced operator performance. All modifications were present in the IOT&E test models and are included in the ongoing production line. Group 0 modifications were incorporated on the production line to the basic (FY96) quantities. All CGSs will be delivered to the government with Group 0 upgrades incorporated.

1.2.2 Group 1-2 P3Is

In December 1997 the PMO initiated Non-Recurring Engineering (NRE) effort to complete a number of software and hardware modifications to the CGS Initial Operational Test & Evaluation (IOT&E) configuration (Group 1). An FY99 modification added Group 2. This combined effort is expected to span 29 months and culminate in the first P3I LUT currently scheduled for 3Q01. Since Group 1 and 2 P3I software mods are required to maintain existing interfaces, these modifications will be cut into the production line and fielded prior to the formal LUT. An updated material release

package will be submitted for approval prior to initial fielding of Group 1-2 enhanced CGSs. This effort will add connectivity with additional sensors using varied communications means and provide additional tools improving the operator's ability to control the display and disseminate information to supported units. Additional sensors include the ARL (MTI, SAR, and EO/IR), the U2 (EMTI) and Predator (EO/IR). Included among the operator tools are radar shadow mapping, video query, and multi-mode enhanced tracking. Information dissemination improvements include remote workstation upgrade, and image compression and correlation. Group 1–2 P3I NRE will also productionize IOT&E generated "fixes", as well as a number of software patches and capabilities developed in support of other service requirements and recent contingency/operational deployments. These products primarily ease operations and do not add additional capability. An additional key Group 1–2 effort is DII/COE, Level 5 certification of the CGS software. As part of the Group 1–2 effort, the operator trainers at Ft. Huachuca will be modified to include the new/enhanced capabilities. Documentation and training for these features will also be developed as part of the NRE effort.

1.2.3 SCDL Improvement Program (SIP)

The SCDL provides the direct downlink of Radar Imagery Intelligence Data collected on board the JSTARS aircraft, as well as the capability for CGS operators to transmit radar service requests to the aircraft. This critical lynch pin to the CGS capability contains a significant number of obsolete parts and older technology that limits capability offered by today's technology. A three phase effort was initiated in FY96 to replace obsolete components with state of the art ADPE circuitry as well as increase throughput capability while reducing size, weight, production unit price and O&S costs associated to the data link. These efforts are completed via contract with Cubic Defense System, the SCDL manufacturer.

1.2.3.1 SIP Phase I & II (SIP I and SIPII)

SIP phases I and II were initiated to correct parts obsolescence by replacing old cards that are no longer manufactured commercially with more capable Commercial Off-The Shelf (COTS) component. Approximately 30 percent of the Printed Circuit Boards (PCBs) were upgraded in FY96 under SIP I, with the balance completed under SIP II in FY98. This effort will result in signficant power savings, enhanced reliability, reduced purchase and O&S cost and a slight reduction in weight. SIP I and II resulted in card for card replacement of the older boards with newer PCBs, but did not add additional capability. The new cards will be introduced in the production line and in the normal maintenance of the SCDL. There will be no requirements for retrofit of the fielded systems.

1.2.3.2 SCDL Improvement Program III (SIP III)

SIP III was planned for start-up in August 1998, however, due to insufficient funds to integrate the SIP III SCDL aboard the E8 aircraft the effort was deferred. Given the increasing quantity of non SIP III SCDLs in the inventory and associated retrofit costs, it is unlikely the SIP III program will be implemented. A new/upgraded Datalink will be considered as part of the RTIP enhancements. Datalink analysis is being conducted as part of the initial RTIP effort. This analysis may recommend completion of SIP III or integration of a completely different datalink.

1.2.4 Group 3

Group 3 P3I completes the Infosec initiatives begun under Group 2. The only other significant effort included in Group 3 is the integration of the Joint Tactical Terminal (JTT). JTT is the objective Intelligence Broadcast Services terminal and replaces the older Commander's Tactical Terminal (CTT) found in the baseline CGS. Other Group 3 efforts include substitution for obsolete GFE.

1.2.5 Post Production Software Support (PPSS)

The CGS is the center piece of the Army's now battle, and maintains interoperability with over one dozen Army and other service systems. Annual maintenance/modification to the CGS software will be required to maintain data connectivity between these systems. Following completion of group 3 P3I's, future CGS modifications will be implemented through a series of minor P3I modifications to the CGS contract. For the most part, these changes will be software only. The new software version will be released to the field on an annual basis. These future system modifications are expected to be accomplished as part of the annual Post Production Software Support (PPSS) maintenance and are not referred to by group designation. Funding for these annual software releases/ upgrades are contained within the PPSS element of the CGS cost estimate.

1.2.6. Tactical Common Data Link (TCDL) Capability

TCDL is a family of extremely high transmission rate Data Links. Development and integration of TCDL capability into the CGS will establish compatibility with additional sensor platforms specified in the CGS Operational Requirements Document (ORD). These include Airborne Reconnassaince Low (ARL), Aeriel Common Sensor (ACS) and multiple UAV platforms. Each of these airborne sensors provide various intelligence and targeting data that will be used in conjunction with JSTARS MTI/FTI. There are various TCDL configurations/products currently in development. Analysis of the various product capabilities and their ease of integration into the CGS will be completed prior to selection of the ultimate solution (FY00-02). Depending on the outcome of the analysis, the TCDL of choice may also provide the werewithal to receive data from the JSTARS E-8 aircraft. The TCDL effort will occur in two phases. The first phase will be selection of a particular TCDL product line, and possible modification of the hardware to address any unique CGS requirement (eg space and weight limitations). Required modifications will be made by the selected TCDL manufacturer. The second phase of the TCDL effort will include integration of the TCDL capability into the CGS. This phase will be performed by Motorola, the CGS prime contractor. The TCDL effort is timed to coincide with the RTIP requirement analysis and development schedule.

1.2.7 Radar Technology Insertion Program (RTIP)

The Air Force will improve the capabilities of the airborne radar system in the E-8. The radar improvements will result in significantly higher resolution displays and increase the density of targets tracked. The enhancements to the imagery intelligence generated by the RTIP program will provide Ground Commanders a distinct advantage in tactical operations. The JSTARS Program Office will modify the CGS to ensure that connectivity is maintained with the RTIP equipped E-8 aircraft and that the CGSs are capable of receiving and exploiting the enhanced radar products and

intelligence/targeting data. Based upon the projected RTIP imagery resolution, revisit rates and other capabilities, major revisions to the CGS software are anticipated in order for the CGS to be able to receive integrate and display the new and improved sensor products. It is anticipated that all prime mission ADPE, will require major modification or complete replacement in order to effect the desired capabilities. The ADPE replacement was programmed as part of the recurring (eight year) COTS hardware replacement/upgrade cycle, and will occur during this timeframe independently of the ultimate RTIP driven mods to the CGS. These ADPE upgrades/replacement will facilitate implementation of any modifications needed to exploit both the RTIP sensor products, as well as data from other sensors.

1.2.8 Automated Data Processing Equipment (ADPE) Upgrade/Rebuy

Given the continuous technology advances in ADPE and rapid obsolesence of Tactical Computers, the JSTARS Program Office plans to replace/upgrade the ADPE suite in the CGS continuously during the 20 year projected CGS life cycle. This will be done primarily via Modification Through Spare (MTS) initiatives but will most likely include at least two major architectural overhauls. The first will occur when the CGSs are upgraded to posture for future connectivity with and exploit the RTIP enhanced radar products. The second is planned at the mid-point between completion of RTIP Modifications and end of system life. The ADPE Upgrade/Rebuy will include the CGS PME as well as the data link and will extend the life of the CGS to 20 years.

1.2.9 Test and Evaluation Plan

Baseline capabilities of the CGS went through Government/Contractor Technical Testing, interface testing, numerous operational assessments, the FY98 CGS IOT&E and the ORDT in FY 99. All capabilities planned for incorporation into the CGS will be subject to Technical Testing by the Government/Contractor Team. All testing will be contractually stipulated and tailored to the specific functionality/capability developed. Multiple P3I may be combined for evaluation during future LUTs and will be "cut" into the CGS baseline only after approval by the CGS Government/Contractor IPT. Fielding of future configurations will be approved by the material release process.

The first post IOT&E fielding of P3I capabilities is Group 1–2, and will incorporate those NRE efforts initiated during FY97-99. This P3I release is scheduled for FY00 in order to participate in the 4Q00 First Digitized Division (FDD) Advanced Warfighter Exercise (AWE). This upgrade is required to maintain interface connectivity with ASAS, AFATDS and other C4I systems that are undergoing modification/upgrade in support of FDD The formal operational evaluation of Group 1 and 2 will occur during the FY01 LUT. A minimum of three CGSs will participate in this assessment. The TCDL enhanced data link and all post Group 2 changes will be assessed in LUT2. While an actual date is TBD, the assessment shall occur in the FY04-05 timeframe. The only hardware modification planned between LUT 1 and 2, is the replacement of the Commanders Tactical Terminal (CTT) with the follow-on system the Joint Tactical Terminal (JTT). JTT is a GFE comms link and provides intel broadcast data as well as general purpose UHF SATCOM (BLOS). JTTs will be inserted into production quantities procured in FY00 and after. It is anticipated that JTT integration into earlier production CGSs, will be a minor field retrofit commencing in FY01. An MOTE will be conducted and serve as the Joint Service RTIP operational test with actual dates to be determined

by the Radar Improvement schedule. The MOTE will also reassess user proficiency and other areas of concern identified during IOT&E. Other P3Is and CGS modifications, particularly those dealing with hardware modification, software maintenance, mechanical layout and other fact of life changes may be implemented without specific operational test. Details of the P3I testing are contained in the Army Annex to JSTARS TEMP dated April 1999 and provided as Appendix G.

1.3 LOGISTICS CONSIDERATIONS

1.3.1 Field Support

1.3.1.1 Maintenance Concept

The Army's maintenance concept for the CGS is for three levels of maintenance: Unit Level, Direct Support (DS), and Depot. At the Unit level, the CGS operators remove and replace Line Replaceable Units (LRU), Shop Replaceable Units (SRU), and components as identified after performing Built In Test (BIT) procedures. If a problem persists, unit level personnel will contact the Direct Support maintenance teams for assistance. These teams will provide limited manual fault isolation and removal/replacement of additional SRUs. All repairable items, as identified by recoverability codes above Direct Support (DS), will be returned through supply channels to the contractor depot. All CGSs are delivered to the Government with a five year system level warranty (excluding the SCDL and other GFE). In order to maintain the required operational availability (Ao) during warranted repairs, CGSs are fielded with minimum requisite provisioning spares (Authorized Stockage List (ASL) and Prescribed Load List (PLL)).

1.3.1.2 Interim Contractor Support (ICS)/Life Cycle Contractor Logistics Support (CLS)

No organic Army depot capability will be developed. The depot study directed by the Aug 93 ADM, showed Life Cycle contractor depot support to be the most cost efficient alternative. All CGSs will be initially supported by the production contractor. This support will include maintenance of both the CGS hardware and software products. The government will not procure full rights or documentation to the CGS software. Consequently, software maintenance will remain sole source to Motorola for the life of the CGS. This support may be augmented in part by government personnel in the future, however some level of support by Motorola will always be required. This requirement is not true for the hardware. Since most of the CGS ADPE suite is COTS products, future CLS for hardware maintenance will be considered for competitive procurement.

1.3.1.3 Regional Support Centers (RSC)

Joint STARS Regional Support Centers are operational worldwide. These depot forward activities provide both maintenance and supply support, reducing total inventory and O&S costs by consolidating these functions within Theater. Two RSC currently exist, one each in Korea and Germany. Additional RSCs will be established in CONUS. Government and Contractor support personnel will be located at each RSC to assist local units in both supply processing and maintenance activities.

1.3.2 Manpower, Training and Simulators

1.3.2.1 Manpower

All CGSs will use existing Military Occupational Specialties (MOS) for operation and maintenance. The CGS components have extensive Built In Test (BIT) capability, which is designed so that 90% of all detected faults can be corrected on site within an average of 60 minutes by an operator/ maintainer. The 96H Imagery Ground Station Operator will operate the CGS and provide unit level maintenance on the electronics package. Non CGS specific equipment (i.e., trucks, generators, etc.) will be supported by additional, in place personnel.

1.3.2.2 Training

PM JSTARS and TRADOC developed a detailed task list covering all operator and maintenance tasks. Training development was structured and executed using the System Approach to Training (SAT) process. Specifically:

a. All Department of the Army CGS operator and maintenance personnel will receive institutional training.

b. Existing courses at TRADOC Centers and Schools; including Officers Basic Course (OBC), Officers Advanced Course (OAC) and Advanced NCO Course (ANCOC) will be modified to incorporate necessary instruction on issues of doctrine and tactics. Training will include mission planning, employment, capabilities, and limitations.

c. The Common Ground Station Training System, (CGSTS) installed at Ft. Huachuca supports all Operator and Unit Level Maintenance Training. A maintenance trainer to support DS/GS Maintenance Training was developed under the CGS program and delivered to Ft. Huachuca to support maintenance training. In addition to the trainers, 3 CGSs have been fielded to Ft. Huachuca to support operator and maintenance training.

d. The Common Ground Station (CGS) has the ability to support in-unit or embedded training for the following functions:
   - Links
   - Sensor data (JSTARS, SIGINT, APACHE)
   - Messages (ASAS, AFATDS, Apache, SCDL, Free text)
   - Tracking, reporting, taskings, crew/team skills, multi-CGS functions

This capability of the CGS allows Army operators to maintain proficiency in operator skills and to participate in distributed interactive simulation exercises.

1.3.2.3 Simulators

The CGS design is based on maximum utilization of commercial off-the-shelf hardware and an open hardware and software architecture. Use of the CGS to support real-time access to worldwide

Army and DoD simulation and exercise applications will create the opportunity to advance the power that Joint STARS provides to the war fighter. The CGS, currently interoperable with Distributed Interactive Simulation (DIS) based simulation systems, and being upgraded to High Level Architecture (HLA) compliance. The DoD HLA is the next generation simulation environment that melds the DIS and Aggregate Level Simulation Protocol (ALSP) technologies together to form a common simulation architecture to facilitate the interoperability of models and simulations among themselves and with C4I systems. The HLA interface capability allows the CGS to interoperate with HLA compliant constructive forces simulations in Advanced Warfighting Experiments (AWEs) and Advanced Concept Technology Demonstrations (ACTDs).

1.4 SAFETY & HEALTH

A System Safety Program was implemented to insure that safety, consistent with mission requirements, is designed into the CGS.

1.5 ENVIRONMENTAL IMPACTS

The system's development and manufacturing processes were evaluated as to the effect on the environment. This Environmental Impact Analysis identified no significant impact to the physical or human environment.

1.6 COST

1.6.1 Cost Drivers

A Life Cycle Cost Estimate was completed and approved by the Cost Analysis Improvement Group (CAIG) as part of the FY93 DAB process. It has been updated and will be revalidated as part of the Milestone III process. While there is no single factor driving overall cost, the key factors in each phase of the program were identified for cost containment initiatives. The primary cost driver during R&D was the actual development of system hardware and software. In the production phase, it is the recurring cost to manufacture the end items. Training is the most prominent cost factor during the fielding phase; whereas the pay of military personnel is the most significant O&S phase driver. Efforts to reduce O&S costs are addressed in the CGS Sustainment Cost Management Annex (SCMA) (Appendix H).

1.6.2 Cost As an Independent Variable (CAIV)

As a lead program for acquisition reform, the CGS has been at the forefront of CAIV initiatives, achieving some exceptional cost reductions. At the time of the initial CGS proposal, a unit cost reduction of 30 percent was established as the initial CAIV threshold. This brought the unit price target to $5M vice the $7.2M cost of the prior LGSM configuration. Actual contract price (first unit) was less than $4.5M, a 37 percent reduction. It is recognized that given the P3I nature of the program, software and hardware enhancements must be integrated into the CGS baseline. While software modifications will only incur the initial development and test expenses, hardware modifications/additions may add to the flyaway cost of the CGS as additional or improved

components are integrated to achieve the expanded P3I capabilities. Despite these modifications / additions, the PMO has set $4.5M as the maximum CAIV value for total CGS unit production costs. As new hardware components and costs are added to the CGS baseline, these increases will be offset by ongoing cost reduction initiatives generated within the production program (see section 1.6.3). While an O&S CAIV target has not been established, the Program Office has implemented a number of initiatives to drive down O&S costs. These include the migration to a single hardware/ software configuration, thereby eliminating multiple O&S tails, establishment of Regional Support Centers (RSCs) to reduce initial fielding/spares requirements as well as spread maintenance and supply costs across regional assets (see section 1.3.1.3) and the incorporation of embedded training capabilities, thereby reducing recurring and refresher training expenses. These initiatives have to date resulted in a 2 to 1 return on investment, and the dividends returned to the Army's TOA during the FY97 Cost Reduction Plan Initiative. Past and future cost containment initiatives are discussed in the SCMA (Appendix H).

1.6.2.1 Value Engineering

The CGS contract contains a mandatory Value Engineering (VE) requirement. This requirement was satisfied when a VE workshop was conducted in March 1996, during which several areas of potential cost savings were identified. The contractor was able to implement the changes without formal Government approval, as contractual requirements were not impacted. Although immediate savings to the Government were not realized, a more compact CGS system resulted, with reduced life cycle costs.

1.6.2.2 Warranty

Each CGS has a five-year warranty that covers all contractor-furnished hardware, contractor-furnished software and the integration and installation of Government-furnished equipment. The warranty coverage includes operating capabilities, maintenance characteristics, reliability characteristics, material defects, and workmanship defects, while limiting exclusions to combat damage, abuse, and unauthorized maintenance/repair.

1.6.3 Tradeoff Analysis

Potential production cost tradeoffs that were and will continue to be considered include the standardization of all ground stations into a single CGS configuration thereby reducing O&S costs. Efforts are ongoing to reduce the price of a number of costly components of the CGS, most notably the SCDL, by modification of the design and manufacturing process. These efforts show great potential for further cost savings.

1.6.4 Army Cost Position

The DA Cost and Economic Analysis Center (CEAC) prepared an Independent Cost Estimate (ICE) and an Army Cost Position (ACP) for the Army JSTARS Program was established by the Army Cost Review Board on April 16, 1999. The validated CAIG Independent Cost Estimate for the Joint STARS Life Cycle costs will be approved as part of the Pre-DAB process.

1.7 QUALITY AND RISK MANAGEMENT

1.7.1 Quality Assurance Plans

Quality assurance provisions are contained in all Ground Station Statements of Work and in system specifications. All solicitations for future P3I will include the requirement for the contractor to have a quality program in place. Government acceptance of the equipment under contract will be based on the successful completion of all acceptance tests.

1.7.2 Technical Risk

Technical risks are low. The CGS baseline configuration has been produced and fully tested. Pre Planned Product Improvements (P3I) will also be fully tested and then added into the production line units. Two technical challenges/risks do exist. The first concerns the power, space and weight constraints within the HMMWV/SICPs shelter configuration and the additional requirements to be placed in these areas in the process to incorporate the initial as well as future P3I hardware modifications. To reduce this risk, key power and weight consumers, particularly the CTT and Ground Data Terminal (GDT) are targeted for downsizing efforts. The second risk to the program is that as radar technology advances, the SCDL may not possess the high data rate throughput necessary to transmit all the radar data and products. Should this occur, the Ground Commanders would not have access to the full intelligence and targeting prowess of the Joint STARS system. Data compression algorithms and other throughput expansion alternatives are presently being evaluated to maintain the critical air to ground link. The SCDL Improvement Program (SIP) initiated in FY97 will posture the SCDL for possible additional data rate and performance enhancing modifications. A possible replacement of the current SCDL may emerge from the Common Data link (CDL) family of high speed data lines. Current CDL products are point to point and do not satisfy the broadcast requirement of the JSTARS system. The Tactical Common Data Link (TCDL), a CDL derivative will provide broadcast mode. TCDL products are also identified as the Data Link of choice for other CGS airborne sensors (UAV, ACS, etc). The fact that the different TCDL manufacturers products are not common and will not interoperative with each other, increases the risk that multiple "Common" Data Links may be required to receive multiple sensor product. This will exasperate the space and weight challenge already placed on the CGS.

1.7.3 Schedule Risk

Schedule risk is considered low. The CGS contractor has been manufacturing and delivering LRIP models at the rate of two systems per month. It is unlikely that the manufacturer will be unable to meet future CGS Production schedule of 12–20 systems per year. Schedule risk lies primarily in the areas of GFE availability and the ability of the Army infrastructure to provide a sufficient number of trained operators to man the CGSs ready to be fielded/deployed. The PMO has increased the size of the CGS trainer in order to accommodate larger class sizes and hence reduce this concern.

1.7.4 Cost Risk

Cost risk is considered low. The unit production cost CGS has decreased considerably through the use of acquisition reform initiatives. Future P3I efforts are funded in the FYDP. Efforts are ongoing to reduce O&S cost drivers and limit future life cycle costs. The single area of cost concern lies in the potential need for several TCDL variants to receive multiple sensor products as described above under technical risk. The ACP only provides for 1 CDL variant and would be undermind if multiple data links are required.

1.8 STANDARDIZATION/INTEROPERABILITY/COOPERATIVE OPPORTUNITIES

1.8.1 Parts and Requirements

The CGS is a commercial environment system and utilizes commercial standard parts, materiel, components and software future products protocols to the maximum extent possible. Interoperability requirements include TACFIRE/AFATDS, CTT/JTT, UAV, and ASAS. These requirements will expand as P3Is are integrated into the CGS baseline.

1.8.2 Cooperative Opportunities

In October 1993, NATO developed a formal requirement for an Airborne Ground Surveillance (AGS) capability. The US is supporting NATO in its Concept Development and Requirement Definition efforts associate with the AGS Program. In addition, the Army has awarded a contract to Motorola Corporation (the CGS prime contractor) to assess the NATO requirements and develop a proposed architectural solution/design, based upon its CGS experience. In addition to the ongoing NATO effort, other nations have expressed mild interest in the CGS. Industrial collaboration could be achieved through coproduction, licensed production, FMS, direct sales, or a mixture thereof. All options will be considered in developing the ultimate cooperative strategy.

2. CONTRACTING APPROACH

2.1 HISTORICAL BACKGROUND

In June 1979, USAERADCOM entered into an Engineering Development (ED) contract with Motorola Inc., for the design and development of the Ground Station Module (GSM) under the Army's Stand-off Target Acquisition System (SOTAS) program. This contract was awarded under fully competitive procedures. Motorola Corp., Scottsdale, AZ was the successful bidder and was awarded the GSM contract. Following the creation of the Joint STARS program by the merging of SOTAS and the USAF Pave Mover program, Motorola was awarded a contract for the completion of the GSM hardware and software design. This contract was awarded in February 1983 as a sole source follow-on to the 1979 SOTAS contract. In August 1984 the Joint STARS program office awarded a contract to Motorola to design, develop, fabricate, integrate, and test eight IGSMs. In December 1988, the Joint STARS program was restructured to synchronize the ground and airborne segments, and incorporate new requirements into the GSM program. As a result of this decision, the Joint STARS program office awarded a contract to Motorola in September 1989, to develop,

manufacture and test four (4) EMD model MGSMs. Due to the low quantity and the fact that the MGSM is a product improvement of the IGSM, it was determined that it was in the Government's best interest to leverage Motorola's experience in GSM development with a follow on sole source contract. The Aug 1993 ADM approved a Sole Source (SS) Firm Fixed Price (FFP) contract award to Motorola Corp., Scottsdale, AZ for the MGSM LRIP quantities (12). The contract was structured as a basic contract (5 units), with an option awarded in FY94 for the additional units. In July 1995, the Government awarded a SS, FFP contract to Motorola for production of 8 LGSM LRIP models. This LRIP contract was approved by the FY95 ASARC.

2.2 CURRENT ACQUISITION PLAN

2.2.1 Technical Flexibility

In FY96, the Government awarded a fully competitive contract for the manufacturing and assembly of the baseline CGSs. The contract was awarded to Motorola Corp., and the FY96-99 quantities were bought as LRIP units. In order to provide maximum flexibility to the contractor, as well as drive down CGS unit price, the CGS contract employed a performance specification that defines the required capabilities while not mandating a build to print configuration. Additionally, the request for proposal included no MILSPEC/MILSTANDARDS. By providing this level of technical flexibility in a competitive Firm Fixed Price environment, the Government was able to ensure best commercial practices throughout the design and manufacturing process, immediately resulting in a significant unit cost reduction.

2.2.2 FAR Exemption

A request to be exempt from FAR 17.204 (maximum five-year contract) was pursued through HQDA, and approved on 8 February 1995. The decision approved an eight (8) year production period (98 months) in order to procure the total number of CGSs required. The use of a single competitive contract for this extended period was considered to be in the best interest of the Government for two reasons. First, a single CGS production contract would secure the best possible price by pricing the entire contract at once, particularly in light of the limited quantities anticipated to be procured in years 6–8 (19 total). Second, this procurement would acquire the total number of CGSs required. No further production quantities or contracts were contemplated minimizing configuration management issues and concerns. To mitigate the offeror's risk in pricing an extended contract, economic price adjustments (EPAs) are in place for years five through eight. The EPAs are based on actual material costs versus an approved commodity index.

2.2.3 Range Quantity Pricing

The eight year contract incorporated range quantity pricing. These ranges originally were provided for potential increase in quantities generated by other services or ongoing NATO demonstrations. In addition, fewer than expected quantities were included given the realities of budget constraint and possible future year decrements. In each year, the contract provides a unit cost for each of three ranges of quantities. Although the actual number of units differ by year to reflect the FY95 anticipated program and funding levels, the range structure is standard throughout and provided for both annual

increases and decreases from the originally anticipated quantity (x). The range format and original anticipated quantity by year is shown below:

	Planned	Actual	Range 1	Range 2	Range 3
Convention	X	Not X	1 To X-2	X–1 To X+3	X+4 To X+8
Basic	10	18	1–8	9–13	14–18
Option 1	12	18	1–10	11–15	16–20
Option 2	12	20	1–10	11–15	16–20
Option 3	10	14	1–8	9–13	14–18
Option 4	10	14	1–8	9–13	14–18
Option 5	7	12	1–5	6–10	11–15
Option 6	6	0	1–4	5–9	10–14
Option 7	6	0	1–4	5–9	10–14
Total	73	96	8–57	65–97	105–137

With these ranges in place, the Government could procure any quantity from 1–137 units. Current plans are to procure a total of 96 units off this contract. These include two for NATO Demonstrations (FY96) and two for the USMC (FY97). The remaining 92, together with the eight CGSs delivered off the LGSM LRIP contract, satisfy the Army Procurement Objectives (APO) of 100.

2.2.4 Performance Baseline

The performance baseline for the FY96 contract was those capabilities/functionality developed in the LGSM program and incorporated Secondary Imagery Data (SIDs) in the CGS as the initial P3I. While no other P3I requirements were priced as part of the basic FY96 contract, the contract envisioned multiple future P3I initiatives that would be executed by either cost-type or fixed-price type contract modifications to be funded by both RDTE and procurement appropriations. Additional enhancements to the baseline were undertaken as Group 0 P3I modifications in FY96 and 97 (as described in 1.2.2) and are in the CGS baseline that was tested at IOT&E.

2.2.5 Group 1–3 P3I

A contract modification was issued in December 1997 for the 29 month Group 1 P3I effort (as described in 1.2.3). The implementation (cut in) of all P3I efforts will be procurement funded, and implemented by firm fixed price modifications to the basic contract. The Group 2 P3I effort was added to the CGS contract by a cost-type contract mod in December 1998. Group 2 P3I only includes software changes. Group 3 P3Is will be added to the CGS contract during 1Q00. This P3I will be implemented via a cost-plus type change modification. Group 2 and Group 3 NRE is expected to each cost between $5 and $10 million upon completion. This cost includes all development efforts, tests, updating of CGS manuals and other logistic products as well as any required changes/ updates to the CGS trainer or training materials.

2.2.6 Depot Level Maintenance

As was previously discussed, the Maintenance Concept for Depot Level repairs of the CGS is Life Cycle Contractor Logistics Support (LCCLS). The FY96 CGS contract included options to perform Depot Maintenance tasks. The Depot Maintenance options were included on a Time and Material (T&M) basis for three years beginning six months after the initial CGS fielding. This contract line item was awarded during FY98, and includes provisions for both hardware and software maintenance. The options include a rate structure for all Depot Labor Categories (DLC) required. Task orders to perform depot maintenance will be generated and executed on an individual, case by case basis. A government ACO representative located on site will provide oversight and assist in administration of the Depot Maintenance tasks. This initial three-year period will enable the government to build failure and repair statistical data that will offer the potential to award future hardware maintenance contracts on a competitive, FFP basis.

2.2.7 Data Link

The SCDL was developed and is currently manufactured by Cubic Defense Systems (CDS) of San Diego, CA. The SCDL consists of two components, the Air Data Terminal (ADT) and Ground Data Terminal (GDT). The ADT is mounted on board the Aircraft and the GDT is integrated into the CGS. The SCDL was originally managed in total by the USAF, however, in FY96 management of the GDT production was transferred to the Army. The Army procures the GDTs via a sole source production contract to CDS and provides the GDT as GFE to Motorola for integration into the CGS. The last option on the initial CDS contract was used to procure the FY99 LRIP quantities (Lot 6). All future quantities will be procured on a follow-on sole source fixed price contract to be awarded following the Milestone III decision.

2.2.8 Future Contracts

It is anticipated that a minimum of four separate contracts will be required to complete the FY00 and beyond P3I program initiatives.

2.2.8.1 First Contract of FY00

The first contractor required to initiate FY00 and beyond P3Is serves as a broadbased technology/ architecture evaluation and demonstration effort to be awarded 2Q00. This cost type contract will have a 24–30 month period of performance and be R&D funded. Major tasks contained in the SOW will include:

1. Future software archtitecture design and sizing.
2. Evaluation of SAR compression alternatives.
3. Assessment of TCDL alternatives to include prototype demonstrations.
4. Weight reduction analysis and alternatives.

5. Simulation exploitation. The final taks associated with the contract will be the building a next generation CGS prototype that will permit rapid hardware swapout to facilitate alternative assessment.

2.2.8.2 Second Contract of FY00

The second contract to be awarded during the FY00 period will be the NRE effort associated with the modification of a TCDL-like capability for rapid interoperability with various additional airborne platforms. Since it is envisioned that multiple TCDL compliant products will be able to provide this capability, it is expected that a competition will be held for a cost-type contract award for the NRE effort. This approach may be modified; however by the results of the ongoing future datalink study being conducted by USAF/USA personnel.

2.2.8.3 Third Contract Associated with Future Upgrades

The third contract associated with the future upgrades will be a sole source, cost type contract to Motorola for NRE necessary to upgrade CGS hardware and software to insure interoperability between the CGS and all sensor platforms is maintained. This effort will include integration of the selected TCDL, as well as the implementation of the design modifications identified during the FY00-02 system architecture and interoperability demonstration contract. The software and hardware achitecture to be integrated under this effort will posture the CGS for future growth and serve as the foundation for implementing the RTIP required modification. Since the CGS SW library contains over 1.3 million lines of code, use of existing code will be a requirement. This contract must be sole source as Motorola is the only qualified manufacturer to modify and upgrade CGS software and integrate this software into a new ADPE suite.

2.2.8.4 Final Contract Associated with RTIP/TCDL

The final contract associated with RTIP/TCDL will be a sole source FFP effort to Motorola to productionize the products developed during the design/development contract (discussed above) and retrofit all CGS to the new RTIP configuration. The Army is looking at the feasibility of procuring the new ADPE through standard Army contracts for Tactical ADPE and providing the ADPE as GFE to Motorola.

2.2.9 Post Production Software Support (P.P.S.S.)

The CGS is a software intensive tactical data processing center that provides interfaces to over 1 dozen weapon systems. Current software library contains well over 1 million lines of code. As P3I capabilities are incorporated through P3I, the Post Production software support effort will grow considerably. Current PPSS cost estimates range from $4 to $8 million per year and in many years may be the only modification released to the field. This effort is currently contracted for within the CGS production contract, however the PMO is currently considering establishing a separate sole source cost type contract to complete this work. In any event, a separate PPSS contract will be required in FY01 following production completion. This contract would consist of a basic award with annually negotiated modifications.

2.3 COMPETITION

The CGS contract was awarded under full and open competition. The Army will explore the feasibility of introducing competition for future depot support and ADPE hardware upgrades, as discussed in paragraphs 1.3.1.2 and 2.2.8.

2.3.1 Component Breakout

The Government has and will continue to purchase CGS initial spares and repair parts as part of the competitive production contract to reduce cost and schedule risk. The ADPE upgrades are being considered for component breakout.

2.3.2 Government Furnished Equipment (GFE)

A complete listing of CGS GFE is provided as Appendix I.

2.4 CONTRACT TYPES

The following contract types are anticipated for future CGS efforts:

Requirement	Contract Type
CGS Production	Competitive Fixed Price (EPA years 5–8) Options
SCDL Production	Sole Source, Firm Fixed Price
TCDL Modifications	Competitive, Cost-type
RTIP Development & TCDL Integration	Sole Source, Cost-type
RTIP/TCDL CGS Production Incorporation	Sole Source, Firm Fixed Price*
Future Depot Support (HW)	Competitive, Firm Fixed Price
Future Depot Support (SW)	Sole Source, Firm Fixed Price
PPSS	Sole Source, Cost Type

* The ADPE may be procured on a standard ADPE requirements type contract and provided as GFE to the CGS prime contractor for integration and test.

2.5 BUDGETING AND FUNDING

All budget estimates are supported by the CGS Life Cycle Cost Estimate (LCCE) that was approved by the CAIG during the DAB process. The LCCE addresses all system costs to include those GFE items planned for data interchange acquisition.

2.6 PRIORITIES, ALLOCATIONS AND ALLOTMENTS

There are no priorities, allocations or allotments being sought in conjunction with this acquisition strategy.

2.7 SECURITY CONSIDERATIONS

The Joint STARS contractual documents are unclassified. The Joint STARS Contract Security Classification Guide and DD Form 254 contain all security classification guidance pertaining to this contract and were provided to the contractor by the Contracting Officer. Safeguarding of classified information will be accomplished in accordance with the Industrial Security Regulation (DoD 5220.22-R) and the Industrial Security Manual for Safeguarding Information (DoD 5220.22-M). Adequate security will be established, maintained and monitored.

2.8 STATUTORY/REGULATORY REQUIREMENTS

2.8.1 National Technologies & Industrial Base Considerations (PL102 484 S4220g)

The CGS program is not dependent on foreign technologies or materials. All acquisitions shall encourage advanced commercial manufacturing techniques and procedures.

2.8.2 Beyond LRIP Consideration (10 USC 2400)

The FY99 Full Production decision will be based upon the results of the FY98 CGS Operational Test and Evaluation and will require a beyond LRIP report to Congress.

3. PARTICIPANTS

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4. LIST OF APPENDICES

A. Program Structure Summary Chart
B. DAB Related Milestones/Dates
C. Delivery and Fielding Schedule by Year
D. P3I Efforts Listed by Anticipated Groups
E. P3I Efforts Listed by Anticipated Year
F. Projected Annual P3I Costs
G. TEMP
H. CGS SCMA
I. GFE List

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